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ADSORPTION

UDC 541.183.66-48:546.131

ADSORPTION OF HYDROGEN CHLORIDE ON CHEMOSORPTION FIBER VION

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 19 May 83) pp 1249-1252

KATS, B. M., LAZAREV, M. Yu., ZVEREV, M. P. and KUTOVAYA, L. M., Scientific-  
Research Institute of Physics, Odessa State University

[Abstract] Filter fabric made of VION ionite fiber has been successfully used to prevent harmful and toxic matter from entering the atmosphere. In the present work a study was made of the equilibrium adsorption of hydrogen chloride on carboxyl-containing VION KH-1 fiber as a function of moisture content and nature of counter-ion. Adsorption isotherms at 298K were determined for ionite samples containing varying amounts of pre-saturated water vapor. Regardless of the nature of the counter-ion, the content of pre-adsorbed water is the deciding factor in the adsorption capacity of the fiber. Of the 7 ionic forms studied, copper-ammonium had the greatest HCl adsorption capacity. However, owing to difficulties in regeneration, the sodium form is preferred for HCl treatment. Figures 3: references 8 (Russian).  
[121-12765]

AEROSOLS

UDC: 541.144+541.182.2/3

FORMATION OF AEROSOL UPON GAS PHASE PHOTOLYSIS OF BENZENE HALIDES

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 11, Nov 84  
(manuscript received 14 Mar 83) pp 1622-1624

SKUBNEVSKAYA, G. I., PASHCHENKO, S. E., DUBTSOV, S. N., ANKILOV, A. N.,  
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Novosibirsk

[Abstract] A study was made of the kinetic regularities of seed formation and physical-chemical properties of the aerosol formed upon irradiation of chloro- and bromobenzene vapor with UV light in a current of air or helium at atmospheric pressure. The aerosol was formed in a cylindrical quartz cube irradiated by the light of a mercury lamp. The reaction mixture was in the irradiated zone for about one second. Dispersed particles are produced under these conditions due to a photochemical reaction in the gas phase. UV radiation breaks the C-X bond, forming a phenyl radical and halide atom. For chlorobenzene the quantum yield of the reaction is 0.4. The aerosol particles developing upon photolysis of benzene halides are shown by electron microscope analysis to be almost perfect spheres measuring from a few tens of angstrom units to a few microns, depending on radiation dose. The aerosol is stable in a vacuum and when heated to 250°C. When precipitated it is a yellow substance, easily soluble in acetone, chloroform, acetonitrile, less soluble in ether, insoluble in water. The aerosol contains products of photo oxidation of benzene halide in air. Liquid chromatography indicates that it is a polymer; the IR spectrum contains oscillations corresponding to the C=O- and OH groups. Figure 1; references 8: 2 Russian, 6 Western. [77-6508]

ALKALOIDS

UDC 615.322:[547.94:582.751.77].012.8

ALKALOIDS OF NITRARIA KOMAROVII. PART 8: SYNTHESIS AND PHARMACOLOGICAL  
PROPERTIES OF ALKALOID NITRAMARIN

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 12,  
Dec 84 (manuscript received 27 Dec 83) pp 1474-1476

TULYAGANOV, T. S., IBRAGIMOV, A. A., YUNUSOV, S. Yu., VAKHABOV, A. A.,  
AMINOV, S. D. and SULTANOV, M. B., Institute of the Chemistry of Plant  
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[Abstract] Nitramarin, with empirical formula  $C_{20}H_{13}N_3$ , has been identified as 1-(2'-quinolinyl)- $\beta$ -carboline (I) and can be synthesized from tryptamine and quinaldine aldehyde through an intermediate 1,2,3,4-tetrahydro-1-(2'-quinolinyl)- $\beta$ -carboline (II). Extraction chromatography gave a yield of 0.00017% nitramarin from dry Nitaria komarovii Iljin et Lava. On white mice, it had an  $LD_{50}$  of 232 mg/kg and an  $ED_{50}$  of 5 mg/kg. In doses of 50-100 mg/kg, it lengthened sleep brought on by hexobarbital and chloral hydrate; doses at a tenth this level brought on short hypnotic activity. Average effective dose for lowering arterial pressure 30% was 5 mg/kg. In contrast, intermediate compound (II) showed hypertensive activity and twice the toxicity. Nitramarin yields to papaverin in hypnotic and spasmolytic activity, but is significantly less toxic and has tranquilizing properties. References 9: 8 Russian, 1 Western.  
[152-12672]

ANALYTICAL CHEMISTRY

UDC 543.423:543.425

DIRECT ATOMIC-EMISSION DETERMINATION OF INORGANIC ELEMENTS IN ORGANIC  
EXTRACTS USING INDUCTION PLASMA

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 28 Nov 83) pp 2120-2125

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Metals, Novosibirsk

[Abstract] A universal combined solvent for organic samples and standard  
reference samples consisting of a mixture of hydrochloric and nitric acids,  
acetic anhydride and o-xylene is proposed, and a method for multi-element  
determination of As, Bi, Cd, Co, Cr, Cu, Fe, In, Ni, Pb, Re, Se, Sn, Te, V,  
and Zn based on atomic-emission was developed. A PV 8210 emission spectro-  
photometer (Netherlands) and a Hewlett-Packard HP-9825A calculator were used.  
The limits of sensitivity of detection are 0.05-1.6 micrograms/ml.  
References 18: 6 Russian, 12 Western.  
[156-12765]

UDC 543.42.062:546.791.4

URANIUM (IV) DETERMINATION BY DERIVATIVE SPECTROPHOTOMETRY OF ITS COMPLEXES  
WITH HYDROXYETHYLIDENEDIPHOSPHONIC ACID

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 14 Dec 83) pp 2133-2136

PERFIL'YEV, V. A., MISHCHENKO, V. T. and POLUEKTOV, N. S., Physical-  
Chemical Institute, UkSSR Academy of Sciences, Odessa

[Abstract] A study was made of the spectral characteristics of uranium  
(IV) complexes with a ligand containing the phosphonic group, e.g.,  
hydroxyethylidenediphosphonic acid (HEDPA). Either U(IV)·HEDPA or U(IV)·2-  
HEDPA complexes are formed, depending on ratio of components in solution.  
These complexes may be used to determine uranium (IV) in pure salts and in

the presence of ferrous ions. In the latter case the second derivative of the absorption spectra is used. Figures 3; references 9: 6 Russian, 3 Western. [156-12765]

UDC 543.544:546.56

#### GAS CHROMATOGRAPHIC DETERMINATION OF COPPER IN CO CONVERSION CATALYSTS

Moscow ZHURNAL ANALITICHESKOY KHMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 26 Jul 83) pp 2179-2182

ASTAPOVA, T. I., FROLOVA, O. D., KUTEPOVA, A. I. and OVSYANNIKOVA, L. V.

[Abstract] A study shows that copper oxide present in moderate temperature, carbon monoxide conversion catalysts may be determined as a chelate complex with pentane-2,4-dione in the presence of a five-fold excess of magnesium oxide by gas chromatography in a column containing 10% polysiloxane DC-20 on Chromosorb W, AW-DMCS. The relative standard departure of results at  $n = 6$  and  $P = 0.95$  does not exceed 0.021. The threshold limit of copper detection is about  $10^{-6}$  g. Figure 1; references 13: 6 Russian, 7 Western. [156-12765]

UDC 543.544.45:543.8

#### GAS CHROMATOGRAPHIC DETERMINATION OF CROWN ESTERS

Moscow ZHURNAL ANALITICHESKOY KHMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 30 Jun 83) pp 2222-2225

FEDOROVA, T. S., KARNISHIN, A. A. and KOSTENKO, T. I., All-Union Scientific-Research Institute of Synthetic Resins, Vladimir

[Abstract] A gas-liquid chromatographic technique is presented for separation of the components in a reaction mixture resulting from crown ester synthesis from cyclopentane and ethylene oxides. The crown esters were identified and methods for quantitative determination based on the above were developed. The crown esters (macrocyclic oligoesters) are important because of their capability of forming complexes with alkali metal salts and other cations. Figures 2; references 5 (Russian). [156-12765]

UDC 543.544:543.4:543.8

CHROMATO-FLUORESCENT DETERMINATION AND CONFIRMATION OF PRESENCE OF  
AFLATOXINS IN FOOD PRODUCTS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 29 Dec 82) pp 2229-2233

KOSTYUKOVSKIY, Ya. L. and MELAMED, D. B., Institute of Nutrition, USSR  
Academy of Medical Sciences, Moscow

[Abstract] Aflatoxins, derivatives of bis-furanocoumarines, are cancerogenic, highly toxic, mutagenic and teratogenic substances produced by molds present in food products and animal feeds. The maximum allowable concentration of aflatoxins in most countries is 5-20 micrograms/kg and 5 micrograms/kg in the USSR. While many chemical and biological methods for determining these compounds have been proposed, most are lengthy and laborious. In the present work, a procedure is presented that is based on thin layer chromatography and fluorescence against standards. The results were confirmed with a U.S.-made Finnigan 3200 F quadrupole chromato-mass spectrograph. References 12: 5 Russian, 7 Western.  
[156-12765]

SYSTEMATIC PROCEDURE FOR IDENTIFICATION OF MICRO-QUANTITIES OF PESTICIDES BY  
THIN LAYER CHROMATOGRAPHY

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 12, Dec 84  
(manuscript received 16 Dec 83) pp 2238-2241

BELASHOVA, I. G., Kiev Scientific-Research Institute of Labor Hygiene and  
Occupational Diseases

[Abstract] The need for developing methods to identify and determine pesticidal residues in various segments of the environment has become pressing. In the present work a highly sensitive express method based on two-dimensional thin layer chromatography is proposed. It may be used to determine combined presence of diazinones, eptams, hexachlorocyclohexane gamma-isomer, phenmedipham, lenacyl, phosphamid and pyrazone. The method may be used to determine pesticides present in the air during agricultural operations. Figure 1; references 6: 3 Russian, 3 Western.  
[156-12765]

CATALYSIS

UDC 665.652.4:541.128.13

CATALYTIC ACTIVITY OF  $Al_2O_3$ , MODIFIED WITH  $BF_3$  IN BENZENE ALKYLATION REACTIONS WITH ETHYLENE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 12, Dec 84  
(manuscript received 22 Jul 83) pp 2681-2684

KOZOREZOV, Yu. I. and LEVITSKIY, E. A., Krasnodar Polytechnic Institute

[Abstract] The effects of polymorphism, pore structure and particle size of aluminum oxide modified with boron trifluoride on its catalytic activity in benzene alkylation reactions with ethylene were studied. The most active alkylation catalyst may be obtained from gamma, eta, delta and theta-modifications of aluminum oxide having a high specific surface, macropores and 1-1.5 mm particle size after calcining under vacuum at 600° and  $BF_3$  modification at a temperature not higher than 100°. Figure 1; references 3 (Russian).  
[151-12765]

UDC 541.128/127:541.183.22

KINETICS OF CYCLOHEXENE EPOXIDATION BY TERTBUTYL HYDROPEROXIDE ON Mo(VI)/CELLULOSE PHOSPHATE CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 5 Sep 83) pp 1348-1355

FILIPPOV, A. P. and POLISHCHUK, O. A., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The kinetics of cyclohexene epoxidation by tertbutyl hydroperoxide on Mo(VI)/cellulose phosphate catalyst demonstrated that the reaction was first order with respect to the catalyst, while first order with respect to the hydroperoxide and cyclohexene prevailed only at low concentrations of these reactants. The products of the reaction and high concentrations of the hydroperoxide exhibited a poisoning effect on the catalyst. On the basis of the kinetic and thermodynamic data a reaction

scheme has been advanced, involving the formation of an intermediate Mo-cyclohexene-hydroperoxide complex. The energy of activation of the decomposition of the ternary complex was on the order of 136 kJ/mole, with an entropy of activation for the process on the order of 290 J/mole·degree. In the case of homogenous Mo catalysts for an analogous reaction the respective energies of activation and entropy for the decomposition of the ternary complex were 72 kJ/mole and 166 J/mole·degree. Comparison of the two sets of thermodynamic data indicates that the ternary complex, affixed to the cellulose phosphate support, is stabilized by additional bonds to the surface of the support and, therefore, exists as a much more ordered or "frozen" entity. Figures 4; references 8: 6 Russian, 2 Western.  
[149-12172]

UDC 542.945+547.534+541.128

CATALYTIC CHARACTERISTICS OF Co(II)- AND Cu(II)-POLYMERS IN LIQUID PHASE  
ETHYLBENZENE OXIDATION

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 31 Oct 83) pp 1356-1360

KAYUMOVA, Sh. A., AZIZOV, U. M., RASHIDOVA, S. Sh., ISKANDAROV, S. I.,  
NORIKOV, Yu. D., KOLOT, V. N. and USMANOVA, M. M., All-Union Scientific  
Research Institute of Chemical Technology of the Medical Industry, Tashkent

[Abstract] The catalytic characteristics of Co(II)- and Cu(II)-polymer complexes (polymer = polypropargyl methacrylate, polyacrylonitrile, or polyhydroxyphenylbrnzoxazole terephthalamide (I)) were analyzed in liquid phase oxidation of ethylbenzene (EB). The nature of the polymeric moiety significantly affected catalytic behavior of the complexes, under reaction conditions (120°C) where the polymers were unaffected by the oxidizing agent. Greatest activity in the conversion of EB to acetophenone was shown by the Cu(II)-I complex, with the Co(II)-I complex showing ten-fold less activity. In addition, I in its own right catalyzed transformation of EB to a hydroperoxide when present in fibrous form, and to acetophenone when present in powdered form. Figures 4; references 11 (Russian).  
[149-12172]



UDC 547.724.2:542.971.3

HYDROGENATION AND HYDROGENOLYSIS MECHANISMS OF 2-METHYLFURAN ON PALLADIUM CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 28 Apr 82) pp 1361-1364

YUSKOVETS, Zh. G., NEKRASOV, N. V., KOSTYUKOVSKIY, M. M.,  
SHIMANSKAYA, M. V. and KIPERMAN, S. L., Institute of Organic Synthesis,  
Latvian SSR Academy of Sciences, Riga; Institute of Organic Chemistry  
imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Determinations were made of the kinetic parameters describing the transformation of 2-methylfuran into tetrahydrofuran and methyl propyl ketone on Pd catalysts at temperatures ranging from 236 to 300°C. The data were analyzed in relation to the partial pressure of 2-methylfuran and hydrogen, and demonstrated that with an increase in the partial pressure of hydrogen the rate of tetrahydrofuran and methyl propyl ketone accumulation increased markedly. However, the rate of methyl propyl ketone formation increased to a greater degree. On the basis of these and other observations, a reaction sequence was proposed for the course of the catalytic transformations. Adsorbed 2-methylfuran initially binds four hydrogen atoms with the formation of gaseous tetrahydrofuran. Since the rate of hydrogenation is proportional to the square root of the hydrogen pressure, binding of the fourth hydrogen should constitute a slow state. In hydrogenolysis during the slow stage, bond 1-5 of the furan ring is opened, preceded by rapid addition of two hydrogen atoms since hydrogenolysis is directly proportional to hydrogen pressure. Figures 2; references 9 (Russian).  
[149-12172]

UDC 541.127

KINETICS OF CARBON MONOXIDE HYDROGENATION ON Ni/Al/Cr CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 26 Apr 83) pp 1365-1368

NAUMOV, Yu. B., STARTSEVA, Ye. S., BEREZINA, Yu. I., SHUMILKINA, V. A.,  
BESKOV, V. S. and TERTERYAN, A. M., State Scientific Research and Planning  
Institute of Nitrogen Industry and Products of Organic Synthesis, Moscow

[Abstract] An analysis was conducted on the kinetics of CO hydrogenation under various conditions, covering a temperature range of 135 to 294°C, and employing commercial Ni/Al/Cr catalysts (32-33% reduced Ni, 10-12% Cr<sub>2</sub>O<sub>3</sub>, remainder γ-Al<sub>2</sub>O<sub>3</sub>). A descriptive kinetic equation was derived on the assumption that hydrogenation of CO is limited by formation of the [COH<sub>2</sub>] complex, that the hydrogenation of intermediate methylene complexes is very rapid and that their concentration is low enough not to inhibit the

reaction, and that adsorptive phenomena alter the surface characteristics of the catalyst. Comparison of experimental and theoretical data demonstrated that at low CO concentrations interactions between gaseous CO and adsorbed hydrogen constitute the primary reaction mechanism. At higher CO concentrations the primary mechanism involved interaction between adsorbed CO and gaseous H<sub>2</sub>. Figures 2; references 10: 6 Russian, 4 Western.

[149-12172]

UDC 541.128

PARTIAL OXIDATION OF ISOBUTYLENE ON ALKALI-METAL-MODIFIED Co/Mo/Bi/Sb  
OXIDE CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 1 Jul 83) pp 1369-1373

VYITNOV, G. F., VINOGRADOVA, O. M., MATYASH, O. V., KUTYREV, M. Yu.,  
ISAYEV, O. V. and LINDE, V. R., Dzerzhinsk Branch, Leningrad Scientific  
Research Institute of Chemical Machine Construction; Institute of Chemical  
Physics, USSR Academy of Sciences, Moscow

[Abstract] The rate of transformation of isobutylene was studied in relation to temperature (320-405°C) and oxygen flow over alkali-metal-doped Co/Mo/Bi/Sb oxide catalyst. The rate of transformation and the product yields were proportional to isobutylene and the oxygen supply. Conversion on reduced catalyst was much lower than on oxidized catalyst, with the selectivity unaffected. Under optimal conditions 96-98% transformation of isobutylene was obtained, with a selectivity for methacrolein of 90-93.5%. The presence of methacrolein in the system diminished the percentage of conversion of isobutylene, although selectivity for methacrolein was retained. Since selectivity for CO and CO<sub>2</sub> also was unaffected by methacrolein, it appears that methacrolein inhibited all of the reactions to an equivalent extent. Mathematical analysis of rate constants confirmed the impression that inhibition in the oxidation of isobutylene was largely due to methacrolein. Figures 4; references 8: 7 Russian, 1 Western.

[149-12172]

UDC 541.128.13

# OXIDATION OF ISOPROPANOL ON Fe-Te-Mo OXIDE CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 16 Sep 83) pp 1382-1387

KOZHARSKIY, V. A., ZHIZNEVSKIY, V. M. and MOKRYI, Ye. N., Lvov Polytechnic Institute

[Abstract] An analysis was conducted on the effects of temperature on oxidation of isopropanol on Fe-Te-Mo oxide catalyst (1:0.85:1), which demonstrated that at 250-340°C the primary product was acetone, while at higher temperatures acetone, acrolein, CO and CO<sub>2</sub> are formed. In addition, the rate of acetone formation at temperatures above 310°C is reduced. In the 280-340°C range isopropanol inhibits propylene oxidation to CO and CO<sub>2</sub>, while acetone is largely formed from isopropanol. At higher temperatures acetone is formed from both isopropanol and propylene. Comparison of the energies of activation for the oxidation of propylene showed that in the presence of isopropanol a value of 138 kJ/mole prevailed, which was twice as high as that calculated for propylene oxidation under water vapor (71 kJ/mole). Therefore, isopropanol appears to inhibit oxidation of the acrolein product by competition for catalytic sites. References 8 (Russian). [149-12172]

UDC 542.943.7:547.279.1

# CATALYTIC OXIDATION OF DIMETHYL SULFIDE INTO DIMETHYL SULFOXIDE BY GASEOUS OXYGEN

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 26 Sep 83) pp 1388-1391

MASHKINA, A. V., SHEPLEV, V. S. and MESHCHERYAKOV, V. D., Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] Various parameters were evaluated for an efficient oxidation of dimethyl sulfide into dimethyl sulfoxide (DMSO) by gaseous oxygen over a vanadium oxide catalyst (IK-23-4), at temperature ranging from 160 to 195°C. Evaluation of the kinetics of the reaction in relation to reactant concentrations indicated that optimum conditions for DMSO production require a conversion temperature below 200°C, that conversion be kept to less than 50%, and that the levels of dimethyl sulfide in oxygen be limited to 0.9 vol% to diminish the chances of an explosion. Unreacted dimethyl sulfide is then readily recovered by distillation because of its lower bp (37°C; vs. 189°C for DMSO and 238°C for DMSO<sub>2</sub>), and can be re-used in the reaction cycle. The IK-23-4 catalyst readily undergoes regeneration at 500°C. Figures 3; references 12: 8 Russian, 4 Western. [149-12171]

UDC 541.128:549.67

# EFFECTS OF POROSITY OF ZEOLITE CATALYSTS ON ACTIVITY AND SELECTIVITY

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 28 Nov 83) pp 1392-1398

BARSUKOV, O. V. and ROSOLOVSKAYA, Ye. N., Chemical Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] The effects of zeolite porosity on the activity and selectivity of zeolyte catalysts in the transformation of n-hexane at 400°C were studied with systems employing inactive supports (aluminosilicate, aluminum oxide, or silicon oxide gels). The gel characteristics were seen to affect distribution of the zeolyte crystals and the number of zeolyte-matrix contact points within the macropores of the catalyst. Consequently, the effects of the structural features of the support media were not limited to facilitation of reactant and product transport relative to the reaction rate on the zeolite. The number of such contacts was a key factor in determining zeolite activity since it resulted in poisoning of the catalyst by sodium ions migrating from the supporting medium. Another factor that figures in diminished catalytic activity was physical blocking of zeolite. Both the cationic and blocking factors contributed to altered activity and selectivity of the zeolite catalyst. Figures 2; references 22: 21 Russian, 1 Western. [149-12172]

UDC 541.183

# KINETICS AND REACTION MECHANISM OF AMMONIA WITH NITROGEN OXIDE ON PLATINUM

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 15 Feb 84) pp 1399-1405

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[Abstract] An analysis was performed on the kinetics of the reaction of NO with ammonia under a pressure of  $1.2 \times 10^{-3}$  Pa at temperatures ranging from 290 to 550°C, using a platinum catalyst. The basic overall reaction was identified as  $4 \text{NH}_3 + 6\text{NO} = 5\text{N}_2 + 6 \text{H}_2\text{O}$ ; under the conditions employed  $\text{N}_2\text{O}$  was not formed, as its formation required lower temperatures and greater pressures. An increase in the temperature from 290 to 330°C led to a sharp increase in the reaction rate, while a further increase to 430°C gave a much smaller gain in rate. At 550°C the rate of the reaction decreased. Ammonia adsorbed to the catalyst reacted irreversibly with adsorbed oxygen atoms with the formation of water and adsorbed nitrogen atoms. Recombination of the nitrogen atoms led to irreversible desorption of  $\text{N}_2$ , and the reaction of adsorbed nitrogen with adsorbed oxygen resulted in desorption of NO. Under the most favorable conditions for the reaction

(330°C) the reaction of oxygen with ammonia appears to consist of two pathways, one leading to the formation of NO and the other to N<sub>2</sub>. Figures 2; references 15: 10 Russian, 5 Western.  
[149-12172]

UDC 541.183

#### INTERACTION OF NITROGEN OXIDE WITH Co/Al<sub>2</sub>O<sub>x</sub> CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 14 Sep 83) pp 1406-1410

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[Abstract] Temperature-dependent desorption spectra were analyzed in order to follow the interaction of nitrogen oxide with Co/Al<sub>2</sub>O<sub>3</sub> catalyst (1-10% wt%). The desorption patterns for nitrogen oxide and the products of its decomposition from the catalyst in the 333-973°C range appeared in the form of 3-4 peaks. The desorption spectra, in conjunction with chromatographic analysis of the desorbed gasses and the concentration and valence and coordination status of Co, showed that, for maximum adsorption of nitrogen oxide and complete decomposition, divalent cobalt was required. Figures 2; references 25: 13 Russian, 12 Western.  
[149-12172]

UDC 541.128

#### MAGNETIC CHARACTERISTICS OF REDUCED Ni-Mo CATALYSTS

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 24 Oct 83) pp 1411-1414

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[Abstract] Thermomagnetic plots were analyzed for samples of reduced Ni-Mo catalysts at temperatures of 196 to 400°C, in order to assess distribution of the components in the crystals of the metallic phase. The crystals of the metallic phase were determined to represent a disordered solid solution of Mo in Ni. As a result, the surface layer of the metallic particles is enriched in Mo and possesses weak paramagnetic properties. The internal nucleus of the crystal, however, is represented by a virtually pure ferromagnetic nickel phase. Figures 3; references 6 (Russian).  
[149-12172]

UDC 572.128.13+547.313

# INTERACTION OF ALLYL RADICALS WITH OXIDE CATALYSTS IN PROPYLENE OXIDATION

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 6 Feb 84) pp 1415-1419

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[Abstract] In order to understand the processes transpiring at the surface of oxide catalysts during propylene oxidation, ESR spectroscopy was employed in studies on the interaction of allyl and allyl peroxide radicals with oxidized and reduced oxide catalysts, e.g.,  $\text{Bi}_2\text{O}_3 \cdot 3\text{MoO}_3$ ,  $\text{ZnO}$ ,  $\text{MnO}_3$  and  $\text{MoO}_3$ . In oxidations carried out at 300 to 600°K it became evident from the spectra that exposure of the catalytic surface to allyl radicals--the catalysts having been pretreated at room temperature with oxygen--resulted in desorption of allyl peroxides from the surface of the catalysts. In addition, the desorption process was accompanied by partial reduction of the catalysts. The reductive process was accompanied by recombination and disproportionation of the allyl radicals on the surface of the  $\text{ZnO}$ ,  $\text{MnO}_3$  and  $3\text{MoO}_3$  catalysts. Figures 4; references 11: 5 Russian, 6 Western.  
[149-12172]

UDC 541.148

# THERMOVACUUM CONDUCTIVITY STUDIES ON SURFACE CHARACTERISTICS OF Ni/Mo OXIDE CATALYSTS

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 14 Jul 83) pp 1432-1436

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[Abstract] Thermovacuum conductivity studies were conducted on Ni/Mo oxides to delineate the phase composition of the surface of such catalysts, data which cannot be obtained by standard x-ray analysis. The studies were conducted at 100 to 400°C on  $\text{NiO}/\text{MoO}_3$  catalysts with molecular  $\text{NiO}:\text{MoO}_3$  ratios of 0, 0.1, 0.5, 0.9, 1.8, 10, 32 and infinity. Four basic types of conductivity profiles were obtained which were related to the molecular ratios on the surface of the catalyst, and ascribed to two types of  $\text{NiO}/\text{NiMoO}_4$  solid solutions. As the concentration of Mo increases the solid surface solution is enriched in Mo and the conductivity plots lose the pattern characteristic of NiO at a ratio of 10. A further increase in Mo to approximately stoichiometric proportions in the  $\text{NiO}/\text{NiMoO}_4$  solution leads to a very stable surface structure resistant to reduction (molar ratio = 1.8). Figures 3; references 11: 9 Russian, 2 Western.  
[149-12172]

UDC 541.128.5

TRIMERIZATION OF ACETYLENE TO BENZENE ON  $\text{NbO}_2$ : KINETICS OF CATALYST POISONING

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 21 Oct 83) pp 1437-1444

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[Abstract] Studies were conducted on the kinetics of acetylene trimerization to benzene on  $\text{NbO}_2$  and  $\text{NbO}_2$  poisoning in a closed reaction system at  $0^\circ\text{C}$ , yielding 99.9% pure benzene. Analysis of the kinetic data demonstrated that both trimerization and poisoning were first order ( $1.0 \pm 0.1$ ) processes with respect to acetylene over a wide pressure range. In addition, catalyst poisoning occurred in two stages, an initial rapid stage in which catalytic activity was lost at the rate of an order of magnitude within a minute, and a slower stage of inactivation measured in hours and leading to complete loss of activity. The first stage was concurrent with a carbonaceous deposit ( $\text{H/C} = 1$ ), approaching 0.7-0.9 th degree of limit deposition. The quantity of acetylene expended on the formation of the deposit layer was 30- to 40-fold smaller than the quantity transformed into benzene during the initial stage of poisoning. These observations demonstrated that during trimerization of acetylene to benzene on  $\text{NbO}_2$  the surface of the catalyst is modified, resulting in altered catalytic activity and selectivity. Figures 4; references 19: 1 Hungarian, 12 Russian, 6 Western.  
[149-12172]

UDC 66.095.217:665.656.2

KINETICS OF n-HEXANE ISOMERIZATION ON MELTED  $\text{AlCl}_3$ - $\text{SbCl}_3$  CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 19 Jul 83) pp 1473-1476

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[Abstract] Isomerization of n-hexane was conducted in an autoclave to determine the effects of the rate of mixing, catalyst:hydrocarbon ratio, and temperature on the kinetics of the reaction. The rate constants were determined for reactions at  $90$ - $150^\circ\text{C}$  with a 1:10 ratio on melted  $\text{AlCl}_3$ - $\text{SbCl}_3$  catalyst (15 mole%  $\text{AlCl}_3$ ) under a pressure range of 0.2 to 1.2 MPa, and at  $90^\circ\text{C}$  for ratios 0.4:10 to 0.8:10, 1.2:10 and 1.4:10. A rate of mixing greater than 1650 rpm had no effect on the kinetics of isomerization. The results are summarized in graphic and tabular form, and mathematical analysis yielded equations describing changes, in the concentration of n-hexane and the products, with time. The energy of activation for the transformation of n-hexane in the  $90$ - $150^\circ\text{C}$  temperature interval was calculated

as 12.3 kJ/mole. The data obtained here are deemed suitable for application to pilot plants concerned with n-hexane isomerization. Figures 2; references 4 (Russian).  
[149-12172]

UDC 541.128

#### EFFECTS OF RARE EARTH CATIONS ON CATALYTIC ACTIVITY OF Y ZEOLITES

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 23 May 83) pp 1480-1482

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[Abstract] An analysis was made of the consequences of replacement of sodium by rare earth cations in Y zeolites on the transformation of hexene-1 at 423 and 523°K. The activity of the zeolites in the degradation of hexene-1 showed a maximum when 63-67% of sodium was exchanged for the rare earth cations. Concomitantly, the energy of activation decreased by 63-67% in that range. In addition, similarly modified zeolites showed a minimum and a maximum in the structural and 'skeletal' isomerization of hexene-1 at 63-67% sodium replacement. These changes were attributed to reaction mechanism involving much weaker proton sites than is the case in the presence of the sodium cation. References 5 (Russian).  
[149-12172]

UDC 541.128.13

#### COMBINED OXIDATION OF CARBON MONOXIDE AND HYDROCARBONS ON RE-USED AP-56 CATALYST WITH EXPOSURE TO SULFUR OXIDES

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 21 Sep 83) pp 1483-1486

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[Abstract] Kinetic studies were conducted on the course of CO and C<sub>3</sub>-C<sub>4</sub> hydrocarbon oxidation at 373-833°K on AP-56 catalyst (Al/Pt), previously used in petrochemical processes, to assess the effects of sulfur oxides on the oxidation process. In the absence of the hydrocarbons, oxidation of CO commences at 373°K and reaches 100% completion at 473°K. Combined oxidation of the hydrocarbons and CO in the presence of SO<sub>2</sub> and SO<sub>3</sub> showed oxidation of CO to be inhibited at temperatures below 773°K, but not above this point. Inhibitory effects of hydrocarbons alone on CO oxidation were evident only at temperatures below 433°K. CO had no effect on the oxidation of the hydrocarbons tested (C<sub>3</sub>H<sub>8</sub>, C<sub>4</sub>H<sub>10</sub>). Therefore, addition of



hydrocarbons diminished the negative effects of  $\text{SO}_2$  on oxidation, presumably by facilitating desorption of  $\text{SO}_3$ --formed by oxidation of  $\text{SO}_2$ --from the surface of the catalyst, thereby increasing the efficiency of the catalyst. Figures 3; references 7: 6 Russian, 1 Western.  
[149-12172]

UDC 547.659.1:547.514.2:542.97:542.952.1

PRODUCTION OF NORADAMANTANE BY ISOMERIZATION OF BREXANE OR BRENDANE IN PRESENCE OF ACID CATALYSTS

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 25 Nov 83) pp 773-778

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[Abstract] Behavior of brexane (I) and brendane (II) in presence of concentrated sulfuric acid and 5% solution of aluminum bromide in n-hexane at room temperature was studied. Analysis of the products of the isomerization of I showed that with both catalysts the results were the same, consisting of II and noradamantane (III). Isomerization of II gave only III, but a total conversion was not achieved. Thus the direction of the isomerization of I and II led to the thermodynamically more stable III. Relative isomerization rate constants are 28 for I and 32 for II, Figures 2; references 8: 3 Russian, 5 Western.  
[140-7813]

UDC 547.636.3:542.97

CATALYTIC CONVERSION OF 1,1-DITOLYLETHYLENES OVER  $\gamma\text{-Al}_2\text{O}_3$

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 13 Apr 83) pp 779-782

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[Abstract] Behavior of individual isomers of 1,1-ditolylethylene over  $\gamma\text{-Al}_2\text{O}_3$  was studied at 460-500°C and contact time of 0.5-2.0 sec. It was shown that 1,1-bis-(p-tolyl)-ethylene, 1-p-tolyl-1-m-tolylethylene and 1,1-bis(m-tolyl)-ethylene underwent isomerization to corresponding dimethyl-trans-stilbenes as well as being subjected to cracking with redistribution of hydrogen to yield 1,1-ditolylethane; 1,2-ditolylethane also formed to some extent. Under these conditions no migration of methyl groups along the aromatic ring was noted. Comparison of the isomerization rates showed that introduction of electron donor methyl groups in positions p-p', m-m', and

m-p of the aromatic rings of 1,1-diphenylethylene increased the isomerization rate by 2-4 fold; electron accepting groups (like chlorine) in p-p positions decreased the isomerization rate. Figure 1; references 12: 9 Russian (1 by Western authors), 3 Western (1 by Russian authors).  
[140-7813]

UDC 547.314:542.941.7:54-44:546.982

NOVEL HIGHLY ACTIVE PALLADIUM CONTAINING SUPPORTED CATALYSTS FOR SELECTIVE  
HYDROGENATION OF ACETYLENE COMPOUNDS TO OLEFINES

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 26 Dec 83) pp 783-789

FROLOV, V. M., PARENAGO, O. P., KOVALEVA, L. S., MIRSKAYA, Ye. Ye. and  
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[Abstract] Experimental results are reported of the study of palladium-containing supported catalysts obtained from the reaction products of  $\text{PdCl}_2$  and tertiary amines used in selective hydrogenation of acetylenic compounds to olefines. These catalysts exhibited high activity (over 20,000 mole substrate per g-at Pd·hr at 20°C and  $\text{P}_{\text{H}_2}$ /0.1 MPa) and practically a 100%

selectivity in hydrogenation of disubstituted acetylenes. Kinetics of above reaction was studied showing that the reaction is of the zero order in respect to the hydrogenating substances. These catalysts were quite stable, retaining their activity even when heated to 200°C. Only at 300°C, total loss of catalytic activity was observed. The activity of these catalysts was retained during several consecutive hydrogenations, removing the reaction products, while introducing a new reactive substrate. Figures 4; references 10: 6 Russian (1 by Western author), 4 Western.  
[140-7813]

UDC 547.31.6:66.042.16:542.971.2:542.971.3

HYDROGENATION OF LINEAR PIPERYLENE DIMERS OVER HETEROGENEOUS AND HOMOGENEOUS PLATINUM CATALYSTS

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 6 Oct 83) pp 790-792

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Industry imeni I. M. Gubkin; Institute of Organic Chemistry  
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[Abstract] Hydrogenation of linear piperylene dimers in presence of Pt-catalysts was studied. It was shown that in presence of a complex homogeneous system  $H_2PtCl_6-SnCl_2$ , the piperylene dimers are selectively hydrogenated to 4-methyl-nonadienes (up to 75% conversion rate). Over heterogeneous catalysts  $Pt/Al_2O_3$  and  $Pt-Sn/Al_2O_3$ , hydrogenation of piperylene dimers occurs nonselectively, yielding mixtures of 4-methylnonane, 4-methylnonene and 4-methylnonadienes. With an atmospheric pressure of  $H_2$  and a temperature of 20-50°C, the trienes did not hydrogenate over  $Pt-Sn/Al_2O_3$  catalyst. Figures 3; references 7: 4 Russian (1 by Western authors), 3 Western.  
[140-7813]

UDC 665.658.2:542.974

INVESTIGATION OF ADSORPTION PROPERTIES OF PALLADIUM ZEOLITE CATALYSTS IN HYDROGENATION OF TOLUENE

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 6 Aug 82) pp 793-798

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[Abstract] Adsorption properties of palladium-zeolite (PdCaY) catalysts (0.5% Pd) with different degrees of crystallinity (0.35-0.95) and magnitude of the silicate modulus (3.8-6.5) were studied along with the relationship between adsorption characteristics of these samples and their catalytic activity in hydrogenation of toluene. It was established that a decrease in the degree of crystallinity and an increase in silicate modulus resulted in lowered adsorption coefficients of the hydrocarbons. During hydrogenation of toluene, the maximum yield of cyclohexane (36%) was obtained with the PdCaY catalyst exhibiting adsorption capacity for the intermediate product (methylcyclohexane) of 5-10 mg/l. Thus, it was shown that differences in adsorption properties of PdCaY catalysts determined their catalytic activity and selectivity. Figures 3; references 8: 6 Russian, 2 Western.  
[140-7813]

UDC 547.732:536.33:542.973

THERMODYNAMIC ANALYSIS OF CATALYTIC HETEROCYCLIZATION OF  $C_6$ -HYDROCARBONS AND HYDROGEN SULFIDE TO ALKYLTHIOPHENES

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 5 Dec 83) pp 799-804

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[Abstract] In a previous paper it was shown that hydrocarbons with iso-structures (alkanes and alkenes) are more reactive in the heterocyclization reaction than are normal  $C_6$ -hydrocarbons. A thermodynamic analysis of equilibrium reactions at 820 K and atmospheric pressure was carried out in an attempt to determine the degree of deviation from the equilibrium and to assess the possibility of increasing the yield of the final products. It was shown that the equilibrium constant of the principal reaction differed substantially from the equilibrium constants of the side reactions. Formation of ethyl- and dimethylthiophenes from hydrogen sulfide and hexen-1, 2-methylpentene-1, 2-methylpentene-2, 4-methylpentene-1, 4-methylpentene-2, and 2-methylpentane approached the equilibrium level with experimentally achievable yields of 82-98%; the yield of 2,3-dimethylbutane was 72.4%. Equilibrium yields of the reaction products were calculated. At 820 K the experimentally-achieved yields of alkylthiophene were 82.8% and of benzene--81%: at 750 K these yields were 24.4 and 10% respectively. References 4 (Russian, 1 by Western authors).  
[140-7813]

UDC 541.128

ISOTOPE EXCHANGE AND HYDROGENATION ON REDUCED Ni/Mo CATALYSTS

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 13 Oct 83) pp 1486-1489

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[Abstract] The functional characteristics of Ni/Mo catalysts were studied in isotope exchange and hydrogenation reactions in relation to the surface features of reduced catalysts. The Ni/Mo catalysts--the  $NiO:MoO_3$  ratio ( $m$ ) ranged from 0.1 to 32; the catalysts were reduced under hydrogen at 350°C for 10 h--were evaluated in terms of rate constants and energies of activation of deuterium/hydrogen exchange in benzene and cyclohexane, and hydrogenation of benzene, the energies of activation were virtually identical on all catalysts ( $m = 0.1$  to 32), while, in the case of cyclohexane, isotope exchange was strongly catalyst-dependent and occurred only at temperatures above 90°C, when  $H_2$  was adsorbed to the catalyst. In addition, the  $m = 32$

catalysts were found to be most active in promoting these reactions, which was presumably due to the fact that their surface was enriched in Ni clusters capable of reversible adsorption of  $H_2$  at relatively low temperatures. References 5 (Russian).  
[149-12172]

UDC 541.128.13

#### COMPARATIVE ASSESSMENT OF $C_3$ - $C_4$ OLEFIN REACTIVITY IN OXIDATION ON Fe/Te/Mo OXIDE CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 18 Oct 83) pp 1490-1493

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[Abstract] Comparative studies were conducted on the relative reactivity and kinetics of  $C_3$ - $C_4$  olefins in oxidation on Fe/Te/Mo oxide catalysts (1:0.85:1) at 308-680°K. On the basis of selectivity of oxidation the olefins in questions were ranked as follows: isobutylene >  $\alpha$ -butylene >  $\beta$ -butylene > propylene. Thermodesorption studies demonstrated that olefins undergo reversible (333-520°K) and irreversible adsorption to the catalyst, and that with an increase in chemisorption characteristics the temperature of the maximum desorption peak decreases, as well as the energy of activation for desorption. In terms of the rate of oxidation the olefins ranked as follows: isobutylene > propylene >  $\alpha$ -butylene >  $\beta$ -butylene. References 12: 11 Russian, 1 Western.  
[149-12172]

UDC 542.952.:661.183

#### TRANSFORMATION OF n-BUTANE ON METAL-LOADED ZEOLITES

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 7 Dec 83) pp 1493-1495

DOROGOCHINSKIY, A. Z., KRUPINA, N. N. and PROSKURNIN, A. L., Groznenskiy Oil Institute imeni M. D. Millionshchikov

[Abstract] Studies were conducted on the transformation of n-butane on metal-loaded zeolites (mordenite, ultrasil [sic]) under hydrogen pressure of 1.5 MPa in the temperature range of 230 to 400°C. Under the conditions specified, n-butane was converted to isoparaffins, with isobutane accounting for 80% of the  $C_4$ - $C_5$  products. In the case of the low metal load zeolites (0.5 wt%) Pt catalysts were more efficient than the Pd-containing catalysts, with the manner in which the metal is introduced into the zeolite being

inconsequential. Under optimal reaction conditions the yield of  $C_4$ - $C_5$  isomers approaches 40 wt%, with a selectivity of 83.7 wt%. References 5: 2 Russian, 3 Western.  
[149-12172]

UDC 541.183

#### FORMATION OF Ni(I) IONS ON SURFACES OF CATALYSTS SUPPORTING Ni(O) COMPLEXES

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 16 Mar 83) pp 1496-1498

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[Abstract] ESR studies were conducted on  $Ni(CO)_2(PPh_3)_2$  bound to  $\gamma-Al_2O_3$  or  $SiO_2$  supports to determine whether Ni(O) complexes are oxidized to Ni(I) complexes on reaction with triphenylphosphine in the presence of ethyl aluminum dichloride as a cocatalyst. Catalysts supporting  $Ni(CO)_2(PPh_3)_2$  complexes lack ESR signals, indicating the absence of Ni(I) during the application of the complex to the support and its interaction with triphenylphosphine. However, exposure of such samples to the cocatalyst leads to the appearance of an intense signal with  $g_{||} = 2.169 \pm 0.001$  and  $g_{\perp} = 2.036 \pm 0.001$ . The signal is stable at room and lower temperatures in an inert gas, and persists after the solvent is removed. Exposure to air results in signal disappearance and color change indicative of Ni oxidation. Since the use of triethylaluminum as a cocatalyst does not lead to the appearance of the signal, the hypothesis is advanced that the paramagnetic Ni(I) ions are formed as a result of oxidation of Ni(O) during substitution of a Cl atom for one of the ligands (either CO or  $PPh_3$ ). Figure 1: references 5 (Russian).  
[149-12172]

UDC 541.128

FORMATION AND STABILIZATION OF NITROGEN COMPOUNDS IN CATALYSTS PROMOTING  
OXIDATIVE AMMONOLYSIS OF PROPYLENE

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 6, Nov-Dec 84  
(manuscript received 29 Jul 83) pp 1498-1500

GADZHIYEV, K. N., KHANMAMEDOVA, A. K., ADZHAMOV, K. Yu. and KUTYREV, M. Yu.,  
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[Abstract] Mass and IR spectrometry, thermodesorption, etc., were employed in an analysis of the formation of nitrogen compounds in P-Mo catalysts ( $P_1Mo_{12}O_x$ ) used in promoting oxidative ammonolysis of propylene into acrylonitrile. In the course of the reaction carried out at 700°K, firmly bound ammonium complexes are formed both at the surface and within the catalyst. A similar phenomenon has been observed with commercial catalysts, representing multicomponent catalytic systems ( $MoBiFeCoNiPKO/SiO_2$ ). The accumulation of such ammonium complexes on and within the catalysts appears to be a prerequisite for the high selectivity of the reaction, leading to the formation of acrylonitrile in the presence of propylene and oxygen. Figure 1; references 5: 1 Russian, 4 Western.  
[149-12172]

UDC 546.74:661.183.6

MECHANISM OF n-PARAFFIN HYDROCRACKING OVER NICKEL SILICATE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 22-23

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[Abstract] To determine the roles of the metal and the acid sites in paraffin hydrocracking over reduced nickel silicate catalyst, a study was made of the effects of catalyst poisons selectively poisoning the L-sites and metallic nickel on the rates of n-dodecane splitting and o-xylene hydrogenation. Piperidine and thiophene were used as catalyst poisons. The L-sites of the nickel silicate are shown to remain and catalyze the splitting reaction during selective deceleration with piperidine. A marked drop in splitting reaction rate on poisoning the metallic sites with sulfur (thiophene) indicates that the splitting reaction occurs as a bifunctional mechanism with the participation of hydro-dehydrogenating sites in the metallic nickel. Reduced nickel silicate is therefore a bifunctional catalyst having both L-sites and highly dispersed metallic nickel. The presence of these sites facilitates splitting of n-paraffins by both hydrogenolysis and by a bifunctional mechanism. References 6: 5 Russian, 1 Western.  
[118-12765]

UDC 66.095.217:665.2:66.095.217.3

## DEVELOPING HYDROCRACKING CATALYSTS FOR OIL FRACTIONS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 23-25

GZHEKHOVYAK, Ye. R. and PNYAK, B., Institute for Chemistry and Technology  
of Oil and Coal; Wroclav Polytechnic Institute (People's Republic of Poland)

[Abstract] A study was made to determine the differences in selectivity of catalysts used for hydrocracking heavy gasolines (Pt) and other heavier cuts of oil (Co-Ni-Mo). Five catalysts were tested on a pilot scale. A 45°-180°C gasoline feed stock was used on the more active catalysts. Data on n-decane conversion at 150-400°C, atmospheric pressure and H<sub>2</sub>:decane ratio of 76 show that conversion over Pt-catalysts takes place at temperatures 200° lower than that of Co-Mo and Ni-Mo catalysts. Benzene was 90% converted into cyclohexane and the latter 70% isomerized to methylcyclopentane over a Pt-on-alumina catalyst. Hydrocracking of the heavy gasoline shows that a mordenite-containing Pt-catalyst was most active. A heavy distillate (36°C) gave a higher yield of diesel fraction with a lower pour point when hydrocracked over a Ni-Mo-alumina catalyst. Figures 4; references 3:

1 Polish, 2 Russian.

[118-12765]



CHEMICAL INDUSTRY

BRIEFS

CHEMICAL PLANT PRODUCTION--Goods worth more than 2,5 million rubles have been produced above the plan by the collective of Ivano-Frankovsk Plant of Precision Organic Synthesis. The yearly obligation has been significantly over-fulfilled. The labor victory was achieved by increasing labor productivity and the effective work of equipment. The assimilation of new production capacities in advance of the schedule enabled the chemists to significantly increase the output of active dyes and textile-accessory substances. Previously the country purchased these products abroad. [Article by N. Petirchuk, Ivano-Frankovsk] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Nov 84 p 1] 12255

CSO: 1841/71

COAL GASIFICATION

UDC [662.74.094.1:662.75]+[665.61:54-114]

OBTAINING LIQUID FUELS AND PETROCHEMICAL FEEDSTOCK FROM COAL LIQUEFACTION PRODUCTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 35-38

ZORINA, G. I. and KON', M. Ya., Central Scientific-Research Institute for Information and Technical-Economic Research in the Refining and Petrochemical Industries

[Abstract] A review of foreign (US, FRG, UK, Australian and Canadian) research on obtaining liquid fuels and petrochemical feedstock from coal liquefaction products (so-called synthetic petroleum) covers the preparation of motor fuels, aromatic hydrocarbons, diesel and jet fuels, boiler fuel and selection of a refining procedure for the synthetic petroleum. References 10 (Western).  
[118-12765]

ELECTROCHEMISTRY

NEW COMPOUNDS PRODUCED IN CARBOCATION REACTIONS

Moscow IZVESTIYA in Russian 26 Aug 84 p 1

[Article by I. Novodvorskiy: "New Technology for Chemistry"]

[Text] On 23 August 1984, the USSR State Committee for Inventions and Discoveries registered a discovery made by a group of chemists of Moscow State University imeni M. V. Lomonosov: USSR Academy of Sciences corresponding member N. Zefirov, and candidates of chemical sciences A. Koz'min, V. Zhdankin, and V. Kirin.

The specialized term "nucleophilicity" refers to the ability of particles of a substance to enter into a chemical reaction with what are known as carbocations--short-lived organic particles with a positive charge on one of the carbon atoms. These reactions have long been widely used in the chemical industry.

But among the nucleophilic particles there are some which seem to be more sluggish, and in the presence of their active colleagues they "do not have time" to enter into the reaction. This phenomenon was established long ago and has been considered an unalterable fact, not depending on any conditions. Moreover, the slow particles even try to get out of the reaction.

In actuality, everything turned out to be somewhat different. Research experiments proved that if a more powerful charge is organized in the carbocations, then the particles which previously avoided the reaction quickly enter into it, forming a great variety of compounds.

The new look at reactions of this type has made it possible to create technology on the basis of which the synthesis of a great number of organic compounds possessing unusual and even unique properties has been implemented. The compounds obtained are the valuable raw material for producing medicines, insecticides, and other chemical products.

In particular, great interest is presented by drugs which stimulate immunity in man--they can find application in the transplantation of organs and tissues. In addition, there are data on the antitumoral activity of a number of the first compounds obtained.

12255  
CSO: 1841/71

UDC 541.135.5

ELECTRO-REDUCTION OF COPPER IONS FROM DILUTE SOLUTIONS ON MAGNETO-FLUIDIZED ELECTRODE

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 30 Sep 83) pp 1268-1271

SHVAB, N. A. and KONDRUK, Ye. I., Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] If an alternating magnetic field is applied over a system of spherical magnetic particles, they will rotate and collide and move in a random trajectory to form a magnetic fluidized layer. If this layer is placed in an electrolyte and a direct current is applied, a magneto-fluidized electrode is created which can be used to extract metals from dilute solutions. In the present work electro-reduction of copper ions from solutions containing 1 mole/liter of sodium sulfate and  $3.15 \cdot 10^{-3}$  mole/liter of copper was studied. The results show that the magneto-fluidized electrode is similar in behavior to that of a fluidized bed. Both copper and nickel ions form mirror-smooth deposits even at threshold currents. Mass transfer on such an electrode is significantly greater than on a fluidized bed, the magnitude being dependent on the particle size. The effective length of a magneto-fluidized electrode is 2.5-3 cm. Figures 4; references 7 (Russian). [121-12765]

UDC 537.29

ELECTRICAL CONDUCTIVITY OF MOLTEN ZINC AND TIN CHLORIDES IN STRONG ELECTRIC FIELDS

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 20 Sep 83) pp 1271-1273

PRISYAZHNYI, V. D., GADZHIYEV, S. M. and LESNICHAYA, T. V., Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev;  
Dagestan State University

[Abstract] Previous study of high voltage conductivity of molten alkaline metal halides and nitrates showed that conductivity increases in strong

electric fields and reaches a threshold value similar to that of aqueous solutions of electrolytes. In the present work a study was made of high voltage conductivity of zinc and stannic chloride which have a more complex structure in the molten state than the alkaline metal salts. Conductivity measurements at 405, 480 and 610°C for zinc chloride and 300°C for stannic chloride made after applying a high voltage impulse discharge, shows that specific conductivity increases with the amplitude of the impulse as in the case with alkaline metals. Apparently, the quasi-lattice structure of the salt is partially destroyed and the defects in the ionic system increase to form supplemental ions which act to transfer current. At higher temperatures the probability of quasi-lattice ionization increases with kinetic energy to inhibit rapid reaching of equilibrium in the molten salt. Figures 2; references 5 (Russian).

[121-12765]

UDC 541.135.3:669.45'22.621.357.9

#### ELECTROCHEMICAL REGENERATION OF LEAD-SILICATE MELTS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 20 Sep 83) pp 1276-1278

ZARUBITSKIY, O. G., MELEKHIN, V. T. and OMEL'CHUK, A. A., Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] Electrolysis of molten salts has been used successfully to recover silver from lead-silver alloys. In the present work results show that silver may be almost completely recovered from spent lead-silicate melts by electrochemical treatment, leaving a residual concentration of 0.0019-0.0021% silver and 0.02-0.03% bismuth. Copper, however, is difficult to separate. An equation for computing the duration of electrolysis and the electrical energy required for leach-in silver out of spent silicate melts is presented. Figures 2; references 2 (Russian).

[121-12765]

UDC: 539.14

SPECTROSCOPIC MANIFESTATIONS OF DYNAMICS OF HYDROGEN ATOM AND STRUCTURE OF  
[(CO)<sub>5</sub>W-H-W(CO)<sub>5</sub>]<sup>-</sup> TYPE COMPLEXES

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 11, Nov 84  
(manuscript received 8 Dec 84) pp 1507-1510

KHARCHEVNIKOVA, N. V. and D'YACHKOV, P. N., Institute of General and  
Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow

[Abstract] The purpose of this work was to produce more complete information on the form of the potential energy surface for movement of protons in complexes with hydrogen bridges  $\mu = \text{HM}_2(\text{CO})_{10}$  (M = Cr, Mo, W) with a numerical estimate of the barriers and to determine the significance of tunnelling of protons. Raman spectral data were used for this purpose. The spectra of the compound  $[\mu\text{-HW}_2(\text{CO})_{10}]^- [\text{Et}_4\text{N}]^+$  were also interpreted. These spectra contain up to 8 bands near 800 cm<sup>-1</sup>; the oscillation of the M-H-M triatomic model in this area should produce one or two bands. Replacement of the proton with deuterium simplifies the spectrum, yielding four bands. Movement of the H atom around the W-W axis is inhibited at four equilibrium positions, between which tunnelling of protons is possible. Figure 1; references 4: 2 Russian, 2 Western.  
[77-6508]

UDC: 538.69+539.143.4

STUDY OF MOLECULAR MOTION OF SHORT-CHAIN MOLECULES IN LIQUID PHASE BY <sup>13</sup>C,  
<sup>1</sup>H NMR METHOD

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 11, Nov 84  
(manuscript received 13 Jun 83) pp 1511-1517

NIKOLAYEV, B. P., All-Union Scientific Research Institute of Especially  
Pure Biological Preparations, Leningrad

[Abstract] The spin echo and <sup>13</sup>C NMR Fourier spectroscopy methods were used to study the translational and rotational mobility of short-chain linear molecules. NMR was used to measure chemical shifts and spin-lattice relaxation time of <sup>13</sup>C nuclei. Molecular motion of short-chain donor molecules was studied on a number of homologs of normal alcohols, carboxylic acids and their esters with not over ten methylene groups. The ratio of self diffusion coefficients of short-chain molecules in SnCl<sub>4</sub> CCl<sub>4</sub> was practically independent of methylene chain length. Similar behavior was observed earlier for saturated hydrocarbons with infinite dilution in alkanes of various molecular weights. The experiments thus showed that the translational motion of short-chain molecules in inert and complex-forming solvents has much in common and is achieved by displacement of individual molecules,

not solvates. The mobility gradient along the ethylene chain which is manifested upon electrophilic attack by a donor molecule acceptor indicates the existence of common rules of change of configuration state of a chain molecule with limitation of mobility of individual links. The weak variation of internal motion of groups of a hydrocarbon chain removed from the coordination site with acid-base interaction indicates that a set of such groups can be considered and inert medium in which independent donor and acceptor centers interact. Figures 4; references 22: 11 Russian, 11 Western,  
[77-6508]

UDC: 541.183

#### INTERACTION OF OSCILLATION-EXCITED OXYGEN MOLECULES WITH THE SURFACE OF ZINC OXIDE

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 11, Nov 84  
(manuscript received 18 Jul 83) pp 1625-1627

GUTMAN, E. Ye., RYL'TSEV, N. V., KAZAKOV, S. A. and MYASNIKOV, I. A.,  
Scientific Research Physical-Chemistry Institute imeni L. Ya. Karpov, Moscow

[Abstract] A study is presented of the interaction of oscillation-excited oxygen molecules with the electron subsystem of a solid body, using thin films of zinc oxide as an example. The electric conductivity method is used due to its high sensitivity to adsorption of active particles such as atoms, radicals and electron excited molecules. For the first time, oscillation-excited molecules were found to influence conductivity of thin ZnO films. Experiments were performed under oil-free conditions at an oxygen pressure of  $1 \cdot 10^{-2}$  mmHg under diffusion conditions. The signal representing the change in conductivity of the ZnO film under the influence of the oscillation-excited  $O_2$  molecules is complex. The authors assume this to be caused by competition of two processes occurring upon interaction of the oscillation-excited molecules of  $O_2$  with the surface. The first involves energy transfer to the solid body upon heterogeneous relaxation of the oscillation-excited  $O_2$  molecules on the surface of the ZnO, accompanied by an increase in conductivity. The second process is apparently chemical and involves additional chemisorption of oxygen in the oscillation-excited state, leading to a decrease in conductivity of the ZnO film. Study of the temperature variation of the acceptor signal of the ZnO film allows determination of the activation energy of chemisorption of the excited  $O_2$  molecules on ZnO. Figure 1; references 8: 6 Russian, 2 Western.  
[77-6508]

INORGANIC COMPOUNDS

UDC 541.65

SHOCK SYNTHESIS OF SOLID SOLUTIONS OF NEODYMIUM AND SAMARIUM CHALCOGENIDES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 30, No 1, Jan 85  
(manuscript received 25 Oct 83) pp 246-248

BATSANOV, S. S., BOKAREV, V. P. and DOROGOVA, G. V., All-Union Scientific-Research Institute of Physico-Technical and Radiotechnical Measurements, Mendeleyevo, Moscow Oblast

[Abstract] Solid solutions of neodymium and samarium chalcogenides were synthesized under conditions of high dynamic pressures, thereby broadening the limits of existence of  $\text{Sm}_a\text{Nd}_{1-x}\text{S}$  with parameters  $a = 5.696\text{\AA}$  to  $x = 0.95$ . The solid solutions  $\text{Sm}_x\text{Nd}_{1-x}\text{Se}$  and  $\text{Sm}_x\text{Nd}_{1-x}\text{Te}$  were synthesized for the first time. X-ray analysis shows that while the selenide and telluride conform to Vegard's rule, the sulfide system departs from it. Figure 1; references 13: 7 Russian, 6 Western.  
[155-12765]

UDC 546.3-1<sup>0</sup>'11

HYDROGENATION OF  $\text{CeCo}_2$  COMPOUNDS IN EXCESS ARGON

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 30, No 1, Jan 85  
(manuscript received 12 Dec 83) pp 257-258

BURNASHEVA, V. V. and IVANOV, A. V., Institute of New Chemical Problems, USSR Academy of Sciences

[Abstract] An X-ray analysis was conducted on hydrogenation products of  $\text{CeCo}_2$  in 1:10 excess of argon to hydrogen at 1.1 MPa total pressure. The initial compound is shown to hydrogenate to form a hydride phase based on the nearest  $\text{CeCo}_3$  compound in the phase diagram ( $\text{CeCo}_3\text{H}_{\sim 4}$ ,  $a = 0.4992$ ,  $c = 3.266\text{ nm}$ ). References 6: 3 Russian, 3 Western.  
[155-12765]



UDC 669.017:539.213

THERMAL STABILITY AND CRYSTALLIZATION OF AMORPHOUS ALLOYS V-Zr-Me  
(Me: Ti, Hf, Ta)

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84  
(manuscript received 24 Feb 84) pp 1134-1138

BARMIN, Yu. V., VAVILOVA, V. V., GALKIN, L. N., ZOLOTUKHIN, I. V.,  
KOVNERISTYY, Yu. K. and RUDA, G. I., Institute of Metallurgy  
imeni A. A. Baykov, USSR Academy of Sciences, Moscow; Voronezh Polytechnical  
Institute

[Abstract] A study was made of the thermal stability of the amorphous state of alloy systems in which complex crystal lattice phases either form or do not form. Alloys based on Group IV and V elements in the systems V-Zr, V-Ti, V-Zr-Hf and V-Zr-Ta were chosen since they were previously shown to exhibit amorphous phases. Thermal analysis shows that V-Zr amorphous alloys have the highest values for microhardness and crystallinity temperatures. Additions of Ti, Hf and Ta have no effect on these properties. Electrical resistance - temperature measurements were made to study the crystallization kinetics of the alloys. Crystallization is shown to take place over an anomalously broad range of temperature. Crystallization of  $V_{66}Zr_{34}$  and  $V_{40}Zr_{42}Hf_{18}$  alloys takes place in a single stage and  $V_{50}Zr_{20}Ti_{30}$  crystallizes in two stages, while  $V_{45.2}Zr_{50.5}Ta_{4.3}$  has a more complex character.

Figures 3; references 10: 2 Russian, 8 Western.  
[136-12765]

UDC 621.921.3:661.657+543.423

EFFECT OF CRYSTALLIZATION MEDIUM ON CHEMICAL COMPOSITION OF MONOCRYSTAL  
SURFACE OF CUBIC BORON NITRIDE

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA A: FIZIKO-MATEMATICHESKIYE  
I TEKHNICHESKIYE NAUKI in Russian No 12, Dec 84  
(manuscript received 11 May 84) pp 71-73

ALESHIN, B. G., SMEKHNOV, A. A., SOKOLOV, A. N. and SHUL'ZHENKO, A. A.,  
Institute of Super-Hard Materials, UkSSR Academy of Sciences, Kiev

[Abstract] Study of impurities in fine surface layers of monocrystals is essential in order to explain the kinetics of processes that accompany crystallization. The present article reports on use of Auger electron spectroscopy and secondary ion mass spectrometry to examine the surface of cubic boron nitride monocrystals (beta-BN). The working gas was oxygen and analysis of both positive and negative ions was conducted on a quadrupole analyzer. The Auger spectroscopy made it possible to identify Li and Al atoms as well as carbon and oxygen impurities in the surface layer of the

crystals. The method of imparting electrical charge was also found to be an important factor in determining the number of impurities. Analysis of secondary ion mass spectra showed the presence of  $\text{LiBH}_4$  and, perhaps,  $\text{Li}_3\text{BO}_3$  compounds. The surfaces of crystals grown by successive deposit methods had 2.5 times as many impurities as those grown by mixing methods. Figures 2; references 7: 5 Russian, 2 Western.  
[74-12131]

UDC 548.5:535.347

#### SEARCH FOR OPTIMUM CONDITIONS FOR GROWING LITHIUM IODATE CRYSTALS

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 17, Issue 6, Nov 84  
(manuscript received 27 Mar 84) pp 61-66

YAKUSHEV, V. G., KIDYAROV, B. I., ISAYENKO, L. I. and DEN'KINA, L. S.,  
Institute of Thermal Physics, Siberian Department, USSR Academy of Sciences:  
Special Engineering-Design Bureau for Single Crystals, Siberian Department,  
USSR Academy of Sciences, Novosibirsk

[Abstract] Lithium iodate single crystals are used in optics and acoustic electronics as materials having high beam stability, piezoelectric and non-linear-optical properties. In the search for those crystal growing conditions under which lithium iodate has improved optical characteristics, a study was made of the transmittance spectra and distribution of dislocation density along the surface of crystals grown from various solutions. Analysis of the spectral data shows that the initial reagents must be extremely pure to obtain high quality crystals. At pH 2.5 or less, solid solution crystals are formed, while, at pH 2.5-4.0, crystals are grown that are defective with yellow coloration. Colorless crystals are formed at pH 5 or above. Figures 3; references 11: 8 Russian, 3 Western.  
[126-12765]

UDC 541.113

#### HEAT CAPACITY AND THERMODYNAMIC PROPERTIES OF CESIUM PERCHLORATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 12, Dec 84  
(manuscript received 10 Jun 83) pp 3005-3008

ZALUKAYEV, V. L. [deceased], GORBUNOV, V. Ye., SHARPATAYA, G. A.,  
GAVRICHEV, K. S. and BABAYEVA, V. P., Institute of General and Inorganic  
Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] The heat capacity of cesium perchlorate had been measured previously at 15-292K under isothermal conditions. In the present work, it

was measured at 10-365K in a vacuum adiabatic microcalorimeter to be  $110.4 \pm 0.2$  Joules/K·mole; entropy (298.15K) =  $175.9 \pm 0.5$  Joules/K·mole; and enthalpy  $H^\circ(298.15K) - H^\circ(O) = 22280 \pm 50$  Joules/mole. Gibbs energy  $[G^\circ(298.15K) - H^\circ(O)]/T = 101.2 \pm 0.2$  Joules/K·mole. Figures 2; references 4: 2 Russian, 1 Western.  
[125-12765]

UDC 539.192

ELECTRON STRUCTURE AND PROPERTIES OF Li, Na, Be AND Mg HYDROXIDES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 12, Dec 84  
(manuscript received 10 Jun 83) pp 3009-3013

RAMBIDI, N. G., APACHKIN, Yu. G. and DEMENT'V, A. I. [typo for DEMENT'YEV]

[Abstract] Although the electron structure and properties of Groups I and II metal hydroxides have been well studied, coarse approximations were often used which places the accuracy of much of the data in doubt. The present work was a systematic study of the properties of LiOH, BeOH, NaOH, and MgOH [sic] molecules and of  $BeOH^+$  and  $MgOH^+$  ions using SSP [Computer System of Standard Subprograms]. Equilibrium inter-nuclear distances, force constants, normal oscillation frequencies and electrical moments and spectroscopic constants were determined. References 25: 14 Russian, 11 Western.  
[125-12765]

NITROGEN COMPOUNDS

UDC 547.791/.792

1-METHYLIMIDAZO[1,2-b][1,2,4]TRIAZOLES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 24 Jan 84) pp 1279-1282

BABICHEV, F. S., YUSOFI, L. al', BUBNOVSKAYA, V. N. and BOYKO, E. V.,  
Kiev State University imeni T. G. Shevchenko

[Abstract] Imidazo[1,2-b][1,2,4]triazoles are part of a larger group of condensed aromatic heterocyclic compounds containing a nodular nitrogen atom. These compounds are used as pharmaceuticals, dyestuffs, photoemulsion stabilizers, etc. Of the eight theoretically-possible isomers of imidazo[1,2,4]triazoles, five have been reported in the literature. In the present work, 1-methylimidazo[1,2-b][1,2,4]triazoles were synthesized by heating quaternary salts obtained from 5-amino-4-methyl[1,2,4]triazoles and alpha-halogen ketones in a mixture of perchloric and acetic acids.

References 8: 2 Russian, 6 Western.

[121-12765]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.234.1+547.241+541.128

GENERAL BASIC PYRIDINE CATALYSIS IN REACTION OF FORMATION OF PHOSPHORUS-  
CONTAINING THIOSEMICARBAZIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 6 Mar 84) pp 2663-2669

YANCHUK, N. I. and BALUKH, V. M., Ternopol State Pedagogical Institute  
imeni Ya. A. Galan

[Abstract] A study of the catalytic properties of pyridine in reactions of diphenylphosphonic acid hydrazide with phenylisothiocyanate in benzene at 25°C shows that it is an effective catalyst. The reaction proceeds in both catalytic and non-catalytic directions, the rate of the catalytic process being three times greater than that of the non-catalytic. Apparently, a hydrazide-pyridine complex is formed in which the imine hydrogen is active. References 25: 22 Russian, 3 Western.  
[150-12765]

UDC 547.241

TETRAALKYLDIPHOSPHINE IMINO OXIDES AND THEIR ISOMERIC PHOSPHONIC ACID IMIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 4 Jul 83) pp 2670-2684

FOSS, V. L., VEYTS, Yu. A., CHERNYKH, T. Ye. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] The kinetically-controlled reaction of dialkylchlorophosphines with phosphonic acid amides and their salts results in the formation of imino oxides of the type  $R_2P(=NX)-PR_2$  which are thermodynamically stable when X is an electron acceptor. However, when X = H, an alkyl or aryl group, electrophilic catalysts irreversibly isomerize the above into an imide of the type  $R_2P-NX-PR_2$ . If R is isopropyl, competing isomerization takes place. In contrast to imides, imino oxides are readily split apart with electrophilic and nucleophilic reagents. References 32: 18 Russian, 14 Western.  
[150-12765]

UDC 546.185

DIAMIDOBROMOPHOSPHAZOALKANES IN REACTIONS WITH APROTIC NUCLEOPHILES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 2 Jan 84) pp 2685-2691

MARCHENKO, A. P., MIROSHNICHENKO, V. V., KUDRYAVTSEV, A. A. and  
PINCHUK, A. M., Institute of Organic Chemistry, UkSSR Academy of Sciences,  
Kiev

[Abstract] Some new phosphoric acid triamides and tetraamidophosphonium salts of cyclic and acyclic structure were synthesized by reaction of diamidobromophosphazoalkanes with aprotic nucleophiles such as tris(N,N-dimethylamido)phosphate (hexametapol), ethylene oxide and N-substituted ethylene imine. These compounds can be used to prepare new organophosphorus compounds. References 9: 8 Russian, 1 Western.  
[150-12765]

UDC 547.241

REACTION OF TETRAKIS(DIALKYLAMIDO)PHOSPHONIUM BROMIDE WITH BASES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 2 Jan 84) pp 2691-2696

MARCHENKO, A. P., KOYDAN, G. N. and PINCHUK, A. M., Institute of Organic Chemistry UkSSR Academy of Sciences, Kiev

[Abstract] Tetrakis(dialkylamido)phosphonium bromides decompose thermally, splitting off an alkyl halide to form triamidophosphazoalkanes. The reaction of tetrakis(dialkylamido)phosphonium bromide with alkali metal hydroxides takes place at three reaction sites: at the phosphorus atom, at the alpha-carbon atom and at the hydrogen atom on the alpha-carbon atom. It also reacts with sodium amides at the latter two sites. References 12: 7 Russian, 5 Western.  
[150-12765]

UDC 547.1'118

REACTION OF MONOTHIOPHOSPHONIC ACID ANHYDRIDES WITH TRIETHYL PHOSPHITE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 21 Nov 83) pp 2697-2701

ANDREYEV, N. A. and GRISHINA, O. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Cyclohexylphosphonic and monothiophosphonic acid anhydrides react with triethyl phosphite to form O-ethyl-O(diethoxyphosphino)cyclohexylphosphonate and O-ethyl-O-(diethoxyphosphino)cyclohexylthiophosphonate, respectively. Hydrolysis and alcoholysis of the mixed anhydrides of phosphorous and phosphonic or monothiophosphonic acids results in the formation of the corresponding di- and trialkylphosphites, monoalkylphosphonates and monoalkylthiophosphonates. Treating cyclohexylphosphonic and monothiophosphonic acid anhydrides with alcohols results in the formation of the corresponding esters. References 19: 13 Russian, 6 Western.  
[150-12765]

UDC 547.241:547.783

SYNTHESIS OF PHOSPHORYLATED IMIDAZOLINE-5-ONES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 1 Dec 83) pp 2701-2703

KHOKHLOV, P. S., KASHEMIROV, B. A., MIKITYUK, A. D., CHIMISHKYAN, A. L. and STREPIKHEYEV, Yu. A., Moscow Chemico-Technologic Institute imeni D. I. Mendeleyev

[Abstract] The literature is lacking in information on phosphorylated imidazoline-5-ones in which the phosphorus atom is bound to a carbon in the imidazole ring. In a continuation of work on the synthesis of C-phosphorylated heterocyclic compounds, 4-phosphorylated imidazoline-5-ones were synthesized in the present work by reaction of 2-phosphorylglycine amides with ortho-formates. The products exist in two tautomeric forms. References 12: 2 Russian, 10 Western.  
[150-12765]

UDC 547.241+547.558.1

SYNTHESIS OF OCTYLBROMOPHOSPHINE BY REACTION OF TRIOCTYLPHOSPHINE WITH  
PHOSPHORUS TRIBROMIDE

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 25 Nov 83) pp 2703-2704

KHOKHLOV, P. S., BERSENEVA, L. S. and SAVENKOV, N. F., All-Union Scientific-  
Research Institute of Phytopathology, Golitsyno, Moscow Oblast

[Abstract] Trioctylphosphine reacts with phosphorus tribromide to form a  
mixture of octyldibromophosphine and dioctylbromophosphine. Dioctylbromo-  
phosphine reacts with phosphorus tribromide to form octyl dibromophosphine.  
References 4: 3 Russian, 1 Western.  
[150-12765]

UDC 547.241.233+548.737

REACTION OF 1,3-DICYCLOHEXYL-2,4-DI(CYCLOHEXYLAMIDO)DIAZADIPHOSPHETIDINES  
WITH ALDEHYDES. FORMATION, CRYSTALLINE AND MOLECULAR STRUCTURE OF  
2,5-DIPHENYL-3-CYCLOHEXYL-4-OXO-4-CYCLOHEXYLAMIDO-1,3,4-OXAZAPHOSPHOLIDINE

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 10 Oct 83) pp 2705-2707

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Tashkent

[Abstract] Previously prepared 1,3-dicyclohexyl-2,4-di(cyclohexylamido)-  
diazadiphosphetidine was found to react with aromatic aldehydes to form  
derivatives of 1,3,4-oxazaphospholidine. The crystalline and molecular  
structures of 2,5-diphenyl-3-cyclohexyl-4-oxo-4-cyclohexylamido-1,3,4-  
oxazaphospholidine were studied by X-ray analysis and PMR-spectra.  
References 8: 7 Russian, 1 Western.  
[150-12765]



UDC 547.242

BASICITY OF DIMETHYLAMINOPHENYL-CONTAINING OXIDES OF TERTIARY ARSENICS IN  
ACETIC ANHYDRIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 16 Jan 84) pp 2708-2711

GAVRILOV, V. I., GALYAMETDINOV, Yu. G., KHUSNUTDINOVA, F. M. and  
ALEKSANDROVA, N. G., Kazan Chemical-Technologic Institute imeni S. M. Kirov

[Abstract] The basicity of dimethylaminophenyl-substituted oxides of tertiary arsines in acetic anhydride was studied to quantitatively evaluate the electron effects of groupings with tetra-coordinated arsenic. Acetoxy-diaryl(alkyl)arsonium cations were found to have a significant electron-accepting effect on the distribution of electron density in the benzene ring. References 5: 4 Russian, 1 Western.  
[150-12765]

UDC 541.138.3:541.49:546.74:547:558.1

ELECTROCHEMICAL STUDY OF Ni(II) COMPLEXES WITH DIPHENYLPHOSPHINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 24 Aug 83) pp 2770-2775

POPOD'KO, N. R., POZDEYEVA, A. A., KAVERIN, V. V., ZHDANOV, S. I., REZNIK, L. B. and YUR'YEV, V. P., Institute of Chemistry, Bashkir Branch, USSR Academy of Sciences, Ufa

[Abstract] Electrochemical methods were used to show that the reaction products of  $\text{Ni}(\text{acac})_2$  and  $\text{NiBr}_2$  with diphenylphosphine contain two Ni-P bonds which split on reduction to form a cluster and diphenylphosphine. The latter is capable of catalytic discharge over mercury with the participation of tetrabutylammonium cations. Figures 4; references 9: 4 Russian, 5 Western.  
[150-12765]

UDC 547.241

ETHYLENEAMIDOIMIDOPHOSPHATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 11 Apr 84) pp 2788-2789

ZAL'TSMAN, I. S., KOYDAN, G. N., MARCHENKO, A. P. and PINCHUK, A. M.,  
Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The first representatives of ethyleneamidoimidophosphates were prepared by reaction of dialkylamidoethyleneamidophosphites and tris(ethylene-amido)phosphite with chloramine followed by treatment with sodium in ammonia solution or N-sodiumhexamethyldisilazane. All other basic types of ethyl-amides of pentavalent phosphorus acids have been synthesized. References 3: 2 Russian, 1 Western.  
[150-12765]

UDC 547.558.1

CONVENIENT METHOD FOR SYNTHESIS OF PHOSPHORUS-CONTAINING HETEROCYCLIC SYSTEMS OF IMIDAZO[2,1-b]THIAZOLES, IMIDAZO[1,2-a]PYRIDINES AND -QUINOXALINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 22 Feb 84) pp 2789-2790

YAGODINETS, P. I., CHERNYUK, I. N. and SHEVCHUK, M. I., Chernovtsy State University

[Abstract] Imidazo- and quinoxaline-containing phosphonium salts can be synthesized conveniently from phosphonium salts having an omega-halogenacyl group by condensation of p-triphenylphosphonium methyl-omega-bromoacetophenone with 2-amino derivatives of thiazole and pyridine. The condensation proceeds in absolute alcohol to form phosphorus-containing imidazo[2,1-b]-thiazoles and imidazo[1,2-a]pyridines. References 5: 3 Russian, 2 Western.  
[150-12765]

UDC 547.26'118

REACTION OF TETRAPHENYLIMIDODITHIODIPHOSPHINATE WITH DERIVATIVES OF  
MONOCHLOROACETIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 2 Feb 84) pp 2792-2794

ZABIROV, N. G., GOL'DFARB, Ye. L., CHERKASOV, R. A. and PUDOVIK, A. N.,  
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] Tetraphenylimidodithiodiphosphinate reacts with monochloroacetic acid, monochloroacetonitrile and methyl monochloroacetate in the presence of triethyl amine to bind up the released hydrogen chloride. The reaction proceeds by transfer of the reaction site to form substitution products via the sulfur atom at the thiophosphoryl group, i.e., P,P-diphenyl-P-thioalkyl-substituted N-diphenylthiophosphinylmonophosphazenes. Reference 1 (Western). [150-12765]

UDC 547.26'118

REACTION OF OLIGOMERS OF 4,5-BENZO-1,3,2-OXAZAPHOSPHOLE WITH PHOSPHORUS  
TRIHALIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 2 Apr 84) p 2794

PUDOVIK, M. A., MIKHAYLOV, Yu. B. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov; Kazan Branch USSR Academy of Sciences

[Abstract] Oligomers of 4,5-benzo-1,3,2-oxazaphosphole were found to react with phosphorus trichloride and tribromide to form 2-halo-3-dihalophosphono-4,5-benzo-1,3,2-oxazaphospholanes. NMR-spectra of the products are presented. Reference 1 (Russian). [150-12765]

UDC 547.87'21'118+541.57

REARRANGEMENT OF DIOXAPHOSPHORINE CYCLES INTO OXAPHOSPHOLENE CYCLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 12, Dec 84  
(manuscript received 16 Apr 84) p 2795

MUKHAMETOV, F. S. and KORSHIN, E. Ye., Institute of Organic and Physical  
Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] While studying dioxaphosphorine systems, a rearrangement consisting of the diminishing of a six-membered ring into a five-membered ring, while simultaneously increasing the coordination of the phosphorus atom from three to four and the formation of a P-C bond, was observed. After standing at room temperature for two days, 2-isopropoxy-4-methylene-5-acetyl-6-methyl-1,3,2-dioxaphosphorine rearranged into 2-isopropoxy-2-oxo-3-methylene-4-acetyl-5-methyl-1,2-oxaphospholene. In a similar manner, 2-ethoxy-4-methylene-5-acetyl-6-methyl-1,3,2-dioxaphosphorine rearranged to form 2-ethoxy-2-oxo-3-methylene-4-acetyl-5-methyl-1,2-oxaphospholene. Reference 1 (Russian). [150-12765]

## PETROLEUM PROCESSING TECHNOLOGY

### DIFFICULTIES IN TYUMEN OIL PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Nov 84 p 2

[Unattributed article: "Difficulties Remain"]

[Text] Of the eight oil and gas production administrations of the Nizhnevartovskneftegaz Association of the Tyumen Main Administration of Oil and Gas, only two are coping with the plan--Belozerneft' and Pokachevneft'. The total obligation since the beginning of the year is 1.7 million tons of oil. This was discussed in a notice under the rubric "Let Us Name the Laggards," published in SOTSIALISTICHESKAYA INDUSTRIYA on 18 September.

Deputy Minister A. Valikhanov concurred with the newspaper's criticism directed at the association and the Ministry of Petroleum Industry. The liability, he writes, must go primarily to the oil and gas production administrations Megionneft', Var'yeganneft', and Ur'yevneft'. In order to correct the situation which has developed, the Ministry of Petroleum Industry, jointly with the Tyumen Main Administration of Oil and Gas, has planned and implemented a number of organizational and technical measures, the most important of which is reducing the number of temporarily shut-in wells. Recently 29 brigades of underground and capital repairs were sent into Nizhnevartovsk from other associations of the sector. They started up more than 480 wells. Energetic measures are being taken to accumulate their own repairs capacities, for which 27 new brigades have been organized.

The Samotlorskiy Field has now managed to bring the number of temporarily shut-in wells to the established norm. Work is continuing here to adopt the advanced gas lift complex. More than 800 wells here are already being worked by this method. The drillers are working well: since the beginning of the year they have turned over for use about 2000 wells, including more than 200 above the plan. This is encouraged by the very effective form of organization in which drilling enterprises hand over capacities "turn key." The adoption of this method has made it possible to reduce by 14 days the time needed to take care of the construction and assimilation. Work to mechanize extraction has been stepped up sharply. This year, 17 percent more wells have been changed over to this method than during the same period last year.

Enterprises of the Nizhnevartovskneftegaz Association are continuing to adopt the brigade form of organizing and providing incentives to labor. Integrated brigades, working in unified duty, are being created. Service zones have been assigned to them, and collectives are being fitted out with the necessary technical equipment, transportation, and instruments. At start-up

projects of constructing oil fields, which directly influence the increase of oil production, the material base is being strengthened, repairs are being made, and highways are being built and restored. The Nizhnevartovskdorstroy remont Trust repaired almost 350 kilometers of roads with various surfaces this year. The association has completed a great volume of work on capital construction of oil-field projects: oil-collecting systems, gas pipelines, water lines, power transmission lines, cluster and pressure-equalizing pump-houses, and oil capacities.

In order to eliminate lagging in oil production, by the end of the year the association has planned to put an additional 245 new oil wells into operation, restore 636 wells, and convert more than 300 to mechanized production.

In order to ensure the level of oil production established for 1985, more than 6,400 geological-technical measures will be carried out, for a yearly effect of several million tons of fuel.

12255

CSO: 1841/71

CONFERENCE ON PROBABILITY METHODS IN OIL PRODUCTION

Baku BAKINSKIY RABOCHIY in Russian 28 Sep 84 p 2

[Azerinform report: "Scientific Research"]

[Text] The all-union conference "Use of Probability-Statistical Methods in Drilling and Oil Production" has completed its work in the Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov. It was opened by the rector of the institute, Azerbaijan Academy of Sciences Academician Prof I. A. Ibragimov.

The use of the theory of probability in drilling is a relatively new direction in scientific research. The first such work was begun 25 years ago in the Azerbaijan Institute of Petroleum and Chemistry, and so it is the Baku VUZ which is now gathering for the fourth time specialists from all corners of the country to discuss the results of the work which has been carried out. The introduction of mathematical methods in drilling and oil production is now widespread in the oilfields of Tyumen, Bashkir, Tatar, and Central Asia. Participants in the conference, visiting from these and other regions of the country, prepared about a hundred reports which were discussed in plenary and sectional sessions. They visited the laboratories of the oldest petroleum VUZ in the country, the seaside oilmen, and the Oil and Gas Production Administration imeni Serebrovskiy.

Azerbaijan Academy of Sciences Academician A. Kh. Mirzadzhanzade commented on the results of the conference.

"We must raise the useful activity coefficient of the technological process, rejecting possible failures in advance. It is important to learn from mistakes. This can be done most precisely using the accumulation of the data bank and mathematical processing of it. Methods of processing have already been created and tested, and it is now important to adopt them as widely as possible. And, however paradoxical it seems, these future directions have taken root least of all in our republic. All-union school-seminars have been conducted three times now to disseminate them. At this conference we have planned directions of further scientific research and effective ways of adopting scientific developments in practice."

12255  
CSO: 1841/71

#### BRIEFS

INTENSIFICATION OF TATAR OIL PRODUCTION--The industrial workers of the Tatneft' Order of Lenin Production Association have extracted 250 million tons of oil from the depths of the earth since the beginning of the 11th Five-Year Plan. Especially gratifying is the fact that 2 million tons above the plan have been produced. The Tatar oilmen reached high boundaries by intensifying production, constant research of ways to increase the oil production of fields, capable organization of prospecting-exploration tasks, and accelerated drilling of wells. In less than 4 years, more than 37,000 single technical innovations have been adopted in enterprises of the association. All of this has made it possible to significantly boost labor productivity and lower the prime cost of production. [Article by A. Mannanov, Almet'yevsk] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Nov 84 p 1] 12255



UDC 63-634.2

DISPERSAL-STABILIZING EFFECTIVENESS OF EXPERIMENTAL ADDITIVES IN FUELS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 12-15

SELIVERSTOV, V. M., IVANOVA, T. L., FIL'CHAKOV, V. V. and IVANOV, I. A.,  
Leningrad Institute of Water Transport; Leningrad Institute of Aviation  
Machine Building

[Abstract] One way to conserve fuel-energy resources is to convert medium speed marine diesel engines to operate on heavy fuels. Such fuels, however, are high in asphalt and resin content and have poor storage qualities as well as poor performance unless additives are provided. A study was made of the dispersal-stabilizing effectiveness of five experimental additives developed at the All-Union Scientific-Research Institute for Oil Refining, the Central Scientific-Research Institute for Oil Refining, the Central Scientific-Research Institute of the Maritime Fleet and the Leningrad Institute of Water Transport. Mixtures of mazut M40 (GOST 10585-75) and diesel fuel L-05 (GOST 305-82) in 25:75 ratio, with and without additives were stored from 1 to 3 months in 1.8 m X 0.15 mm columns. Samples were withdrawn and analysed periodically for asphaltene content. Fuel-additive mixtures were also cycled through fine metal filters, and the results subjected to mathematical and statistical analyses. Optimum additive content for high viscosity M40 fuel is 0.4% (by weight), and 0.3% for medium viscosity fuels. Figures 3; references 5 (Russian).  
[118-12765]

UDC 665.73/75

## IGNITION CHARACTERISTICS OF REVERSE WATER-FUEL EMULSIONS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 15-17

YAKOVLEV, A. V., LUNEVA, V. V., GLADKIKH, V. A. and AZEV, V. S.

[Abstract] The use of water-fuel emulsions can result in 2-9% fuel economy, depending on the engine and type of work. There are also less smoke and oxides of nitrogen in the exhaust gases. A diesel test engine was modified so that various parameters such as fuel line pressure before injection, ignition delay period, injection advance angle and intake air temperature could be monitored. Runs were made on diesel fuel L-0.2, macroemulsions (10% water and 5% pentol and OP-4 emulsifier), and microemulsions (10% water and 5.6% oleic acid). Cetane number was found to have a weakly expressed linear relationship to water content for the microemulsions, apparently due to the lack of "microexplosions" in the combustion chamber. The macroemulsions had low sedimentation stability, poor pumpability as compared to base fuel and required engine modifications, although less emulsifier was needed and there was less carbon formation in the engine. Concrete recommendations could not be made for using any specific emulsion, although it is probable that micro- and macroemulsions will find use under certain conditions. Figures 4; references 9: 5 Russian, 4 Western.  
[118-12765]

UDC 621.892.86:621.314.212

## EFFECT OF FRACTIONAL COMPOSITION OF TRANSFORMER OIL ON ITS ANTIOXIDANT PROPERTIES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 17-18

KULIYEV, R. Sh., AGAYEVA, R. A. and KULIYEV, F. A., Institute of the Petrochemical Industry imeni Yu. G. Mamedaliyev, AzSSR Academy of Sciences

[Abstract] A study was made of the effects of fractional composition on the antioxidant and service properties of TKp transformer oil from Baku crude. Fractional composition was determined by a method developed at the Grozny Scientific-Research Institute and the data listed with that of "Mobil Corp." oil for comparison. Analysis of the data shows that commercial grade transformer oil has a wide range fractional composition (boiling starts at 228-290°C and ends at 420-448°C). Study of the antioxidant properties shows that fractions boiling in the 300-408°C range have the best stability, comply fully with Requirement TU 38101890-81 and have a slightly lower acid number. Tests show that these oils have improved service properties in an electric field. Reference 1 (footnote).  
[118-12765]

UDC 662.75.629.113.338

TECHNICAL-ECONOMIC EVALUATION OF EFFECTIVENESS OF USING ALTERNATE MOTOR FUELS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 18-21

TERENT'YEV, V. A., STAL', F. V., KONSTANTINOV, B. P., ARSENOV, Ye. Ye. and TYUKOV, V. M., All-Union Scientific-Research Institute for Oil Refining; Central Order of Labor Red Banner Scientific-Research Automobile and Motor Car Institute; State Scientific-Research Institute of Automotive Transport; USSR Gosplan

[Abstract] About 10% of the total energy resources of the country are used for transportation needs, and 40% of this is expended on motor vehicles. While advances in technology and the organization of delivery have lessened fuel consumption somewhat, they have not been able to solve all of the problems in supplying the energy needs of the transportation network. In the present work, the possible advantages, problems and economic feasibility of using alternate motor fuels are discussed. The fuels considered are conventional gasolines with petroleum components (A-76 gasoline with 8% MTBE, gasoline with 5% methanol and 7% isobutanol stabilizer), and totally non-petroleum fuels (methanol, liquefied propane-butane, compressed and liquefied natural gas and synthetic liquid fuel from coal). Figure 1; references 8: 7 Russian, 1 Western.  
[118-12765]

UDC 665.765-404.0:621.89

DETERMINATION OF SODIUM NITRITE IN COMPLEX SODIUM GREASE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 84  
pp 30-31

KRAKHMALEV, S. I., VOROTNIKOVA, V. A., TEN, N. V. and TARANOVA, N. V., All-Union Scientific-Research Institute for Oil Refining

[Abstract] A method was developed for the quantitative determination of free sodium nitrite in sodium greases. The sodium nitrite is extracted with benzene and water and then determined by photolorimetric analysis of the diazonium salt obtained by reaction with Rivanol. Figure 1.  
[118-12765]

UDC 665.73.083.001.42

EFFECT OF ANTIOXIDANT ADDITIVES ON STABILITY OF SECONDARY ORIGIN GASOLINES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian Vol 12, Dec 84  
pp 34-35

TALISMAN, Ye. L., ALEKSEYEVA, Ye. V. and SIRENKO, T. M., EF All-Union  
Scientific-Research Institute of Oil Refining

[Abstract] Along with the more extensive refining of petroleum arises the question of effective utilization of secondary origin gasolines, which have higher amounts of residues following oxidation as compared to straight-run and hydrofined gasolines. Since residue formation ceases with termination of the induction period, it is hypothesized that it is related to thermopolymerization rather than oxidation. Chemical stability of both thermally cracked and pyrolysis gasolines in the presence of various antioxidant additives was evaluated by length of the induction period and by the content of actual resins. Additive ATP and a synergistic mixture of ionol and neozone were most effective with the induction period. The results confirm the hypothesis that oxidation is not the prevailing reaction, and while the additives increased the induction period, they had no effect on residue formation. Greater amounts of residue were formed in the olefin-containing thermally cracked gasoline. IR-spectra indicate that the basic change in the gasolines during oxidation is formation of carbonyl compounds. Figure 1; references 3 (Russian).

[118-12765]

UDC 665:61.033.52.55:543.52

X-RAY-RADIOMETRIC DETERMINATION OF VANADIUM AND SULFUR IN CRUDE OILS

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84 pp 723-728

NADIROV, N. K., GORELKINSKAYA, S. I., ENKER, M. B., KOTOVA, A. V. and BUYANOVA, N. S., Kazakh State University imeni S. M. Kirov; Institute of Petroleum Chemistry and Natural Salts Chemistry, KazSSR Academy of Sciences

[Abstract] Corrosive properties of crude oils are caused by admixtures of vanadium and sulfur. Intensive studies are under way to find methods of purifying crude oil from these contaminants. To control such purifications, a rapid method must be available for determination of V and S. One of the most promising methods is based on X-ray radiometric analysis of the specimens. A simple and inexpensive apparatus was developed for rapid determination of above elements with a sensitivity of  $2.6 \cdot 10^{-4} \pm 3.2$  rel-% for vanadium and  $6 \cdot 10^{-2} \pm 10.0$  rel-% for sulfur. The presence of the latter did not interfere with the determination of vanadium. Figures 4; references 4: 3 Russian, 1 Western.

[140-7813]

UDC 665.61.033.55

## DISTRIBUTION OF VANADIUM AND VANADYLPORPHYRINES IN PETROLEUM FRACTIONS OF DIFFERENT CHEMICAL TYPES

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84 pp 729-732

ALESHIN, G. N., ALTUKHOVA, Z. P., ANTIPENKO, V. R., MARCHENKO, S. P. and KAM'YANOV, V. F., Institute of Petroleum Chemistry, Siberian Department of USSR Academy of Sciences, Tomsk

[Abstract] Distribution of vanadium among petroleum components: tars, asphaltenes and oils from various levels of Samotlorsk fields was studied. It was shown that the predominant fraction of vanadium and vanadyl porphyrines is concentrated in petroleum tars. The highest absolute concentration of V was noted in the asphaltene fraction, however, Vanadium atoms were found to be bound to heteroatomic fragments of the tarry-asphaltene compounds. Up to 98% of vanadium contained in asphaltenes and almost all V atoms in oil fractions are bound by non-porphyrinyl compounds. With increased methanization of the petroleum fractions, their V content drops rapidly. Figures 2; references 5 (Russian).  
[140-7813]

UDC 665.61.033.55:547.583.2

## VANADIUM ISOLATION FROM PETROLEUM OF KALAMKAS FIELDS BY MEANS OF SULFOACIDS

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84 pp 739-742

NADIROV, N. K., YERGALIYEVA, A. K., KOTOVA, A. V., AUBAKIROVA, G. B. and MORUNOVA, M. A., Institute of Petroleum Chemistry and Natural Salts Chemistry, KazSSR Academy of Sciences, Gur'yev

[Abstract] Anhydrous sulfoacids (p-toluenesulfonic acid, o-sulfobenzoic acid, sulfanilic and sulfosalicylic acids) were used to extract vanadium from Kalamkas field petroleum. The degree of vanadium extraction was determined from the petroleum ash residue after removal of the sulfoacids. Best results were obtained using p-toluenesulfonic acid (after a double contact--75% extraction was achieved) and sulfobenzoic acid (47% extraction after a single contact). Analysis of the final product showed that, along with a decrease in the content of vanadium, the treated petroleum exhibited lower levels of ash, asphaltenes, porphyrines and sulfur. References 8: 3 Russian (1 by Western author), 5 Western.  
[140-7813]

UDC 665.613:543.862:543.51:543.54

HIGH BOILING ARENES OF PALEOZOIC PETROLEUM FROM WESTERN SIBERIA

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 12 May 83) pp 751-759

GOLOVKO, A. K., KAM'YANOV, V. F., KOROBITSINA, L. L., KURAKOLOVA, Ye. A.,  
RUSINOVA, G. V. and PETROV, Al. A., Institute of Geology and Processing of  
Fossil Fuels, USSR Academy of Sciences; Institute of Petroleum Chemistry,  
Siberian Department of the USSR Academy of Sciences

[Abstract] Composition of aromatic components of middle and high boiling  
distillation products of Maloikh field petroleum was studied. Using thin  
layer chromatography and mass spectroscopic analysis, 15 isobaric-homologous  
series of aromatic hydrocarbons and 5 series of sulfur-aromatic compounds  
were found in this particular petroleum sample. Distribution of monocyclic  
aromatic hydrocarbons by molecular weight showed a large plateau in the range  
of C<sub>12</sub>-C<sub>24</sub>. The refining arenes were distributed unimodally in the range  
of 3-6 carbon atoms of the alkyl substituents. It was shown that natural  
processes of the formation of petroleum composition cause parallel changes  
in the structural-group characteristics and in aromatic components of the  
system, leading to an enrichment of arenes with aliphatic fragments in  
methane petroleums and with alicyclic fragments in the naphthene petroleums.  
References 7 (Russian).

[140-7813]

UDC 665.7.033.53:543.422.4:543.544

NEUTRAL HETEROATOMIC COMPOUNDS OF DIESEL DISTILLATE FROM SAKHALIN PETROLEUM

Moscow NEFTEKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 17 Jun 83) pp 760-765

RAPOPORT, V. L., RAZUMOV, N. V., KHOMIK, L. I. and PANASYUK, T. B.,  
Khabarovsk Polytechnic Institute

[Abstract] An attempt was made to obtain neutral nitrogen compounds from  
Diesel distillate in sufficiently pure state to be able to study them by IR  
and UV spectroscopy. It was shown that the following compounds were present  
in it: N-alkyl(cycloalkyl) derivatives of indole (benzindole); indole free  
of substituents at the nitrogen atom and various compounds with complex  
ester groupings. The adsorption of these complex esters resembled that of  
the indoles. Allowing for the order of compound isolation along with the  
similarities in IR spectra in the region of skeletal and deformation  
vibrations of the aromatic groups, it was assumed that the complex ester  
fraction contained compounds with a tertiary nitrogen atom of the indole  
type and a complex ester group. Figures 4; references 9: 3 Russian,  
6 Western.

[140-7813]

PHARMACOLOGY AND TOXICOLOGY

UDC 547.554:547.572.1

omega-AMINODERIVATIVES OF 4-(3,4,5-TRIMETHOXYBENZOYLAMINO)-ACETOPHENONE AND THEIR PHYSIOLOGICAL ACTIVITY

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 29 Aug 83) pp 1291-1296

KLYUSHIN, V. V., PORTNYAGINA, V. A. and POCHINOK, V. Ya., Kiev Scientific-Research Institute of Pharmacology and Toxicology

[Abstract] Derivatives of 3,4,5-trimethoxybenzoic acid are used as sedatives and as coronary medications. In the present work, 23 omega-derivatives of 4-(3,4,5-trimethoxybenzoylamino)-acetophenone were synthesized by various methods. Preliminary biological testing indicates that some of these compounds act on the central nervous system. Depending on the structure of the substituent in the omega-position, either a central stimulating or depressing effect is observed. The toxicity of the psychostimulating compounds is 10 times greater than that of the depressants. References 5: 1 Russian, 1 Czech, 3 Western.  
[121-12765]

UDC 547.814.5

SYNTHETIC ANALOGS OF NATURAL ISOFLAVONES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 12, Dec 84  
(manuscript received 6 Jul 83) pp 1301-1306

KHILYA, V. P., LUK'YANCHIKOV, M. S., KAZAKOV, A. L. and GORBULENKOV, N. V., Kiev State University imeni T. G. Shevchenko

[Abstract] It was previously demonstrated that plants of the Fabaceae family, especially the clovers, contain flavones and isoflavones which have pronounced hypolipidemic action, lowering cholesterol and triglyceride levels in blood serum. In the present work, a number of isoflavones containing electron-donor and -acceptor groups in the 2,6- and 4-positions were synthesized from 2,4-dihydroxydesoxybenzoins in 80-90% yields. Biological

testing shows that the new isoflavones are hypolipidemic as expected, but not as pronounced as that of the known compounds. References 5 (Russian). [121-12765]

UDC 579.873.21.083.134

STUDY OF MEDIA COMPOSITION FOR GROWTH OF MICROBACTERIA SPLITTING OFF SIDE CHAIN OF SITOSTEROL

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 12, Dec 84 (manuscript received 30 Dec 83) pp 1480-1482

GABINSKAYA, K. N., KOROBova, Yu. N. and MESSINOVA, O. V., All-Union Scientific Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Oxidative removal of the sitosterol side chain by bacterial action can be achieved with the use of an inhibitor (8-hydroxyquinoline) to protect the steroid skeleton. Results are heavily dependent on the choice of media. With *Myc. mucosum* 3-AP, a Peterson media with added 1% glucose and 2% wort gave a 49% yield of two oxidation products, with the proportion between the two dependent on the quantity of cell mass. Mannitol and glycerin completely inhibited the oxidative action on sitosterol, while glucose, lactose, sucrose and maltose stimulated it. By varying the media, growth can favor either the S or R forms of this organism; the former gives a higher yield of useful oxidation products of sitosterol, but the latter selectively oxidizes to a single product. *Myc. flavum* B<sub>2</sub> on a somewhat more complex synthetic media gave a 44% yield of one oxidation product. Glycerin and mannitol inhibited this by 50%; excluding glucose or substituting one of the other sugars had no apparent effect. Substitution of a Peterson medium halved the activity, indicating a preference for ammoniacal nitrogen. Use of distilled water, instead of tap water with microelements, also halved the yield. References 3 (Russian). [152-12672]



UDC 615.33.012.6+663.1].074:543.272.62

MEASUREMENT OF PARTIAL PRESSURE OF DISSOLVED CARBON DIOXIDE BY DIFFUSION-  
IMPULSE METHOD IN PROCESSES OF MICROBIOLOGICAL SYNTHESIS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 12, Dec 84  
(manuscript received 9 Jan 84) pp 1514-1519

CHAGIN, B. A., All-Union Scientific Research Institute of  
Antibiotics, Penza Branch

[Abstract] Impulse adaptations of diffusion measuring techniques reduce the need for a continuous supply of high-purity carrier gas and allow the partial pressure of the measured gas within the collector tube to come close to equilibrium with the partial pressure within the liquid. In the scheme presented, a 6 m long coiled silica collector tube was connected to the measuring cell of a gas analyzer. A feedback loop reduced the effect of such uncontrolled variables as impurities or moisture levels. Tube sensitivity gradually decreased in use as its pores were partially clogged by the fermentation media; this effect can be compensated by a correction factor. The duration of the carrier-gas impulse must be chosen to insure that the measuring cell has a full charge of the gas being analyzed. Working measurements indicated that measurement errors were less than 9%, an acceptable level for practical applications in microbiological processes. Figures 3; references 6 (Russian).  
[152-12672]

## POLYMERS AND POLYMERIZATION

### GAMMA RADIATION IN PLASTIC PRODUCTION

Minsk SOVETSKAYA BELORUSSIYA in Russian 2 Nov 84 p 2

[Article by D. Patyko, Belorussian Wire Agency, Gomel: "Arithmetic in Using the Gamma Quantum"]

[Text] Scientists of the Belorussian Academy of Sciences Institute of the Mechanics of Metal-Containing Polymer Systems were forced to produce the destructive power of gamma radiation. They proposed an original method of obtaining unusual polymers--extremely strong, and at the same time having the lowest possible friction coefficient. In order to combine what seemed to be incompatible properties, researchers subjected ordinary polyethylene to radiation treatment in an oxygen medium.

Penetrating into the depth of the material, gamma quanta knock atoms of hydrogen out of the polymer. In their place, a strong chemical bond of neighboring molecules is formed. Because of this, the durability of the plastic is increased by a factor of 300, and the maximum temperature of use is doubled. At the same time, the oxygen is doing its work, penetrating into the surface layer of the plastic with the help of that same radiation. It changes the structure of the material so that the molecules begin to slide more easily relative to one another. As a result, the modified polyethylene obtains a friction coefficient which is twice as low as the acknowledged "favorite" in this field--fluoroplastic.

The invention had scarcely been born when it was ordered in production. Specialists of the Gomel Machine Tool Plant imeni S. M. Kirov were the first to adopt the new friction units, and have already saved tens of thousands of rubles this way. Here too a variation of the scientists' innovation began to be used with a great effect--a lubricant including particles of the radiation-treated polymer. These miniature plastic spheres, taking the main load on themselves, do not permit the lubricant to be squeezed out of the friction zone, and increase by several times the operating life of the machine.

"Replacing seemingly irreplaceable plastics, especially fluoroplastic, with inexpensive modified polyethylene will bring a vast savings in all sectors of machine building," says Candidate of Technical Sciences V. V. Smirnov, one of the inventors of the innovation. "After all, fluoroplastic cannot be either punched or cast. Parts made from it can be produced only by using mechanical processing. And this means that for all its expensiveness and scarcity, frequently half of the stock goes into shavings and is irrevocably lost. But

look--" and the scientist took a small ring of white plastic from the table--  
"This fluoroplastic packing ring is an essential part of every modern machine.  
It costs 9 rubles 34 kopecks. And now the same ring made from modified poly-  
ethylene. The cost is 28 kopecks in all, and the quality is greater."

12255

CSO: 1841/71

UDC 536.24:486.31.021.125.27

STUDY OF KINEMATIC AND THERMAL SHAPING PARAMETERS OF PROFILED FILAMENTS FROM  
MOLTEN POLYMERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 12, Dec 84  
(manuscript received 31 Mar 84) pp 2697-2701

SVISTUNOV, V. A., GENIS, A. V., REYN, D. M., KHEYSO, V. A. and VOL'F, L. A.

[Abstract] Some mathematical relationships were derived for determining rates, cross sectional areas, temperatures and tensile stresses occurring during the shaping of profiled filaments from polymer melts. Results obtained by theoretical calculation agree favorably with experimental data. The formulas may be used to calculate working parameters and shaping dimensions for profiled filaments. Figures 2; references 7: 3 Russian, 4 Western. [151-12765]

UDC 543.42.062:547.288:678.675.126

SPECTROPHOTOMETRIC DETERMINATION OF TRACE AMOUNTS OF CARBONYL COMPOUNDS IN  
 $\epsilon$ -CAPROLACTAM WITH AID OF p-DIMETHYLAMINO BENZALDEHYDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 12, Dec 84  
(manuscript received 8 Nov 83) pp 2760-2765

NIKONOV, N. T., MIKHEYEVA, L. A., MALYSHEVA, I. I. and GLAZKOVSKIY, Yu. V.,  
All-Union Scientific-Research Institute of Synthetic Fibers, Kalinin

[Abstract] During synthesis of polycapramide, epsilon-caprolactam ( $\epsilon$ -CL) is subject to air-oxidation to form carbonyl compounds which have a negative effect on the polymerization process and on the polymer. Although the presence of these compounds may be quantitatively determined by polarography, photometric methods are more simple, rapid and are capable of detecting trace amounts ( $<0.1$  mcg-eq/g). In a further study of the sensitivity of the photometric method, the spectrophotometric behavior of reaction products of p-dimethylaminobenzaldehyde with any possible traces of carbonyl compounds was investigated. These products are shown to be weak complexes. An

improved spectrophotometric technique for determining total content of carbonyl compounds in technical grade  $\epsilon$ -CL is presented. Figures 4; references 7: 6 Russian, 1 Western.  
[151-12765]

UDC 621.315.616.96:539.3

#### ROLE OF PHYSICAL PROCESSES DURING AGEING OF POLYETHYLENE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84  
(manuscript received 27 Feb 84) pp 1139-1141

BRAGINSKIY, R. P. and MOISEYEV, Yu. V.

[Abstract] A study was made of the ageing of stabilized low-density polyethylene at 70°-105°C in air, a surfactant (20% OP-10 in water) and 0.5-1.5 MPa external stress load at 15-20% constant deformation. Induction period during ageing was determined by isothermal calorimetry at 220° in a stream of oxygen. The degree of crystallinity was determined by differential scanning calorimetry and the relaxation transitions were determined by dynamic mechanical analysis at 2.5-100 Hz frequency. All measurements were made on a Du Pont Instrument Co. TA 1090 Thermoanalyzer. Service properties began to show changes before the end of the induction period after ageing for 1000 hours at 70°-90°. A low temperature recrystallization process takes place below the melting point which results in fissuring. A formula is presented by which it is possible to determine the time prior to fissuring. Figures 4; references 4: 3 Russian, 1 Western.  
[136-12765]

UDC 541.124:541.15:541.64

#### HIGH DOSAGE RADIATION INDUCED COPOLYMERIZATION OF STYRENE TO ACRYLIC MONOMERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 5, Dec 84  
(manuscript received 27 Feb 84) pp 1160-1163

KABANOV, V. Ya. and ALIYEV, R. E., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] A comparative study was made of radiation-induced graft copolymerization of styrene to acrylonitrile, styrene to methylmethacrylate and styrene to acrylic acid at 0.08, 0.16 and 0.25 Gr/sec (gamma-radiation) and 100, 1000 and 6000 Gr/sec (accelerated electrons,  $E = 1$  Mev). Monomer mixtures were grafted onto 70 micron thick film of low density polyethylene. The results indicate that graft copolymerization of styrene to acrylonitrile and to methylmethacrylate is a radical mechanism up to 100 Gr/sec, and then becomes an ionic mechanism at 1000 Gr/sec. The transition point for the

styrene-acrylic acid system is 6000 Gr/sec. The data further indicate that the classical theory of radiation graft polymerization as a purely radical process is not valid commencing at some certain radiation doseage. Figures 4; references 6: 4 Russian, 2 Western.  
[136-12765]

UDC 678.026.3:643'42'5.026.01

#### EFFECT OF OLIGOISOBUTYLENE ON PROPERTIES OF EPOXY RESIN COATINGS

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 10-11

BERESNEV, V. V., STEPANOV, Ye. A., KIRPICHNIKOV, P. A., YEMEL'YANOV, Yu. V. and GOLOVIN, V. A.

[Abstract] Adding oligoisobutylenes containing terminal carboxyl groups has been shown to improve the corrosion resistance of materials prepared by room temperature hardening of epoxydiane oligomers ED-20 and 42% novolac phenol-formaldehyde in furfural with polyethylene polyamide and hexamethylene-tetramine. A study was made of the effect of adding an isobutylene modifier containing terminal carboxyl and ketone groups on the properties of epoxy coatings. Tensile strength, shear stress, and resistance to corrosion tests show that addition of the modifier improves the service properties of the coatings which may be used to protect chemical equipment.  
References 3 (Russian).  
[128-12765]

UDC 678.742.2-405:535

#### OPTICAL FILTERS BASED ON FOAM POLYETHYLENE

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 12-14

CHERNYAVSKAYA, N. A., MATYUKHINA, G. N., POLUSHKIN, Yu. I., FILIPPOVA, Ye. I., FOMINA, T. N. and RYCHAGOVA, K. A.

[Abstract] To suppress the upper orders of the spectrum in long-wave infrared spectrascopic instruments, zero-order filter echelettes, metallic screen or ground glass mirrors are used. These filters all have a high level (over 5%) of short-wave background interference and they strongly polarize reflected radiations, thereby requiring complex optical systems with minimum apertures and low angles of incidence. The possibility of using foam polyethylene as cut-off filters was studied. Both open and closed cell foam polyethylene samples were tested on a transmission spectrophotometer. It was established that the open cell foam is not suitable as filter material, but by varying the closed cell size, specific pressure during compression and the content of gas-former in the foam, it is possible to alter the

cut-off boundary in the filter within a narrow range and thus create a bank of cut-off filters for various wavelengths between 100 and 10  $\text{cm}^{-1}$ . The level of short-wave background is less than 1%, the filters do not polarize reflected radiation and they are inexpensive and simple. References 9: 6 Russian, 3 Western.  
[128-12765]

UDC 678.84.01:546/547.07

SYNTHESIS AND PHYSICAL-CHEMICAL PROPERTIES OF ADAMANTYL-CONTAINING OLIGOORGANOSILOXANES

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 14-15

LAVYGIN, I. A., SKOROKHODOV, I. I., SOBOLEVSKAYA, L. V., LEYTAN, O. V., PRIBYTKO, A. M. and DOBROVINSKAYA, Ye, K.

[Abstract] Polymers containing the adamantyl group have resistant to heat, oxidation, light and solvents. By modifying an oligoorganosiloxane with adamantyl derivatives, it is possible to obtain materials with improved service properties. In the present work, 5 oligoorganosiloxanes were synthesized which contain both dimethylsiloxane linkages and branched trimethylsiloxy-beta-adamantylethylsiloxane groups. The oligomers were synthesized by hydrolytic polycondensation of organochlorosilanes followed by catalytic rearrangement of the hydrolysis product. Physical-chemical properties of the oligomers are presented. It was established that the activation energy of viscous flow increases from 15.1 to 62.6 kJoules/mole on introducing adamantyl groups to 62% of the A-linkage. Therefore, introduction of the trimethylsiloxy-beta-adamantylethylsiloxane linkage to the dimethylsiloxane chain increases the level of intermolecular interaction and the potential for internal rotation of the linkage about the siloxane bond, resulting in increased chain rigidity and heat resistance of the oligomer molecule. Figures 2; references 3: 2 Russian, 1 Czech.  
[128-12765]

UDC 678.743.22:678.049-416

NEW PVC-BASED FILM MATERIAL, MODIFIED WITH OLIGOESTER FOR MELIORATIVE AND  
AQUA-CULTURE CONSTRUCTION

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 20-22

SAFRONOVA, R. F., PENSKAYA, Ye. A., STROD, Ya. A., REKNER, F. V. and  
GUL', V. Ye.

[Abstract] The properties of polyvinyl chloride can be modified by blending with oligomers capable of polymerization. After a temporary plastic stage, the material hardens to form graft or cross-linked copolymers. A study was made of the possibility of modifying PVC film with an oligomer consisting of 50% solution of polydiethylene glycol maleinate adipinate with 2,4-toluylene-diisocyanate in TGM-3 (industrial grade VPN-1) with Ba, Cd, and Zn salts of fatty acids, organophosphorus stabilizer Phorstab K-201 and epoxidized soy-bean oil added as stabilizers. The films were subjected to light and heat ageing in a Japanese-made equatometer and natural ageing on frames facing south at 45° to the horizon. Some samples were placed in ferro-cement water baths. The results showed that modification of PVC with oligoester VPN-1 improves the tensile strength and deformation properties, decreases thermal-oxidative destruction during shaping, lowers the brittle point temperature and improves resistance to ageing when in contact with soil, water and air. PVC film compositions containing 5-50 parts by weight of VPN-1 oligoester can be used in hydraulic construction as water-impermeable screening. Figures 3; references 10 (Russian).  
[128-12765]

UDC 678.742.2-416:66.018.4

PEVD AND PEND COMPOSITIONS AS STERILIZEABLE HEAT RESISTANT FILM MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 26-27

FOMINA, L. L., PENSKAYA, Ye. A., MOROZOVA, M. R. and GUL', V. Ye.

[Abstract] Food preservation in containers made of composition film material is more economical than conventional containers due to savings in handling and sterilization expenditures. Such composition films must have high strength, low gas and water permeability and high heat resistance, and be capable of withstanding product sterilization at 120°C. This type of film material can be obtained by blending low and high pressure polyethylene (PE). A study was made of the possibility of making films from high pressure PE Grade 10803-020 (GOST 16337-77) and low pressure PE Grade 277-73 (TU 6-05-1870-70) with 140°C melting point and 0.960-0.965 g/cm<sup>3</sup> density. Analysis of the physical-mechanical properties of several blends shows that these materials can be used for making sterilizeable food packing material suitable for long-term storage. Figure 1; references 3 (Russian).  
[128-12765]



UDC 678.742.2:543.544.45

#### GAS CHROMATOGRAPHIC ANALYSIS OF PE PYROLYSIS PRODUCTS

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 34-35

BRATCHIKOV, A. V., BERENDEYEV, B. A. and IVANCHEV, S. S.

[Abstract] Gas chromatographic separation, identification and quantitative analysis of the pyrolysis products of industrial grade samples of high and low pressure polyethylene at 600°C in a stream of helium shows that they contain 1-alkenes, n-alkanes, terminal alkadienes, 2-alkenes, 3-alkenes, iso-alkenes, monosubstituted alkanes, cyclanes, aromatic hydrocarbons, dimethylalkanes and dimethylalkenes. The resulting data may be used to determine the possibilities of using polyethylene for thermal reactions in an inert atmosphere or vacuum. Figure 1; references 10: 1 Russian, 9 Western.

[128-12765]

UDC 678.742.2-416:63

#### PHOTO-DESTRUCTIVE PE-FILMS FOR AGRICULTURE

Moscow PLASTICHESKIYE MASSY in Russian No 12, Dec 84 pp 37-38

BORODULINA, M. Z., ZELENKOVA, T. N., KONDRASHKINA, N. I., KURZHENKOVA, M. S. and KOTOVICH, I. N.

[Abstract] Photo-destructible polyethylene film that crumbles apart after a period of time was developed at the "Plastpolimer" ONPO. This film is used in agriculture where the photo-destruct effect is timed to the vegetation period of certain crops. The film contains photosensitizers enabling it to photo-destruct after 2, 3 or one month's time. Maximum photo-destruct was observed in radiation-modified polyethylene film where the molecular weight decreased from 50,000 to 2,500-5,000 and relative elongation dropped to null after 1-1.5 months. The films were tested for mulching potatoes, growing grape seedlings and grafting grape, fruit and flower plants. They were effective with early potatoes and rare varieties of grape. New types of colored, foamed photo-destruct film are being developed that is heat insulating. Thin films (40-60 mkm) capable of photo-destruction in 2-2.5 months are being made from secondary polyethylene, low molecular weight polyethylene and atactic polypropylene. Figure 1; references 6 (Russian).

[128-12765]

UDC 678.743.22-944

## CHLORINATION OF PVC IN SOLUTION

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 84 pp 27-28

LISITSKIY, V. V., KRASNOVA, T. P., DENISOV, Ye. N., MOROZOV, Yu. D.,  
SHAPOVALOV, V. D. and DMITRIYEV, Yu. K.

[Abstract] Conditions of polyvinyl chloride (PVC) chlorination in solutions were studied as they affected molecular characteristics, microstructure and quality of chlorinated PVC (CPVC). Ozonization of CPVC in THF solution followed by oxidative hydrolysis of polymer products was accompanied by lowering of their characteristic viscosity: the higher the degree of PVC chlorination, the greater was the depression of viscosity. Evidently, during the chlorination process there occurs elimination of HCl with formation of new double bonds in the macromolecules. Concurrently with destruction of the peripheral groups (by elimination of HCl), there occurs a destruction of the principal chain and as a result of it, the molecular weight of CPVC is lowered. It was concluded that improved qualities of the PVC chlorinated in solution are due to the fact that the chlorination was performed in a homogeneous medium with complete solution of PVC. Figure 1; references 7: 4 Russian, 3 Western.

[158-7813]

UDC 678.742.3.01:536.485

## EFFECT OF SAMPLE PREPARATION METHOD ON PROPERTIES OF COMPOSITIONS BASED ON PP

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 33-34

GLAGOLEVA, Yu. A., TIKHONOVA, G. P., SHRAMAN, N. D., BELOGLAZOVA, G. A.  
and KHIN'KIS, S. S.

[Abstract] Modification of polypropylene (PP) with polyisobutylene (PIB), double and triple ethylene propylene copolymer (SKEP and SKEPT, respectively), butyl rubber and other elastomers increased its impact viscosity at low temperatures. Principal physical-mechanical properties, structural characteristics and thermal stability of frost resistant, impact resistant compositions PP + PIB and PP + SKEPT were compared, the test samples being prepared by pressing and casting methods. Physical-mechanical properties of casted and pressed samples differed substantially because of the orientational effects observed during the casting process. Data from one method of plastic preparation could not be used in analysing the other method. Data obtained on casting samples were of greater interest because this is the method used in production of many technical components. Figure 1; references 4 (Russian).

[158-7813]

UDC 678.5-137.644.3

DEFORMATION-STRENGTH PROPERTIES OF HYDROPHILIC LATTICE COPOLYMERS

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 30-33

STARODUBTSEV, S. G., BOYKO, O. K., PAVLOVA, N. R. and KABANOV, V. A.

[Abstract] Deformation-strength characteristics of synthesized gels from the copolymers of N-vinylpyrrolidone (VP) with ethylene glycol monomethacrylate (EGM) methylmethacrylate (MMA) and crosslinked ethylene glycol polymethacrylate (EGPM) containing poly-N-vinylpyrrolidone (PVP) were studied. Analysis of experimental data showed a relationship between composition heterogeneity of the copolymers VP + MMA, VP + EGM and PVP + EGPM and the properties of corresponding hydrogels, especially pronounced in case of VP + MMA. Association of hydrophobic segments during the swelling of these copolymers in water leads to the formation of a strong skeleton which is the reason for the glossy characteristics exhibited by the polymer hydrogels. Excess VP during its polymerization serves as a matrix, while MMA forms hydrophobic inclusions in the hydrogel, making them superior to the other two combinations studied. Excellent mechanical properties of VP + MMA and their transparency in thin layers makes them useful in production of contact lenses. Figures 2; references 8: 3 Russian, 5 Western.  
[158-7813]

UDC 678.744.325.764.43

PRODUCTION OF PMMA AND COPOLYMER MMA + STYRENE WITH ANTISTATIC PROPERTIES

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 6-7

KHAZRYATOVA, L. Kh., KUZNETSOV, Ye. V., BIKMULLINA, L. A., KUSHKOVA, T. M., DOBRYNINA, T. N., VASILENKO, Yu. I., LAGUNOVA, V. N., SERZHANINA, V. N., and KOZLOV, N. S.

[Abstract] In an attempt to obtain polymers with long-lasting antistatic properties, methylmethacrylate copolymers with styrene (MMA) and polymethylmethacrylate (PMMA) were synthesized containing unsaturated tertiary ammonium salts. The highest antistatic effect of PMMA was obtained with 1.5% of dimethyl-(carboxymethyldecyl)-ammonium chloride; with MMA + styrene good results were obtained upon addition of 2% of dimethyldiallylammonium chloride, dimethylallyl(octadecylammonium)acrylate and dimethylallyl(carboxymethylcetyl)ammonium chloride. Specific surface electric resistance of these polymers was  $10^8$ - $10^{11}$  ohm: the antistatic effect was a long lasting one. References 4: 2 Russian, 2 Western.  
[158-7813]

UDC 678.664:541.182

PV-DISPERSIONS SYNTHESIZED USING POLYHYDROXYPROPYLENEDIOL WITH VARYING MW

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 8-9

NEPYSHNEVSKIY, V. M., SAMIGULLIN, F. K., MOSHAROVA, O. Ya., NAYMARK, N. I., SMIRNOVA, T. F. and DEMINA, A. I.

[Abstract] A synthetic method was developed for highly concentrated polyurethane (PU) dispersions with low viscosity starting from 4,4'-diphenylmethanediisocyanate (MDI), Lapramol-294 and polyhydroxypropylenediol (PHPD) (molecular weight 1000 and 2000). The inability of PU-dispersions to adequately impregnate the fabrics is due to relatively large size of their globules forming during the suspension process (30-40  $\mu\text{m}$ ). PU dispersions obtained by the method being described had particles in the range of 2.5-8.0  $\mu\text{m}$ . The content of small particles in these PU dispersions was a function of the molecular weight of PHPD: maximum content of 4-10  $\mu\text{m}$  particles was 51% with PHPD having molecular weight of 1200 and 77% with the molecular weight of 1400. Films obtained from this type of PU-dispersions were rather hard. Figures 2; references 9: 8 Russian (4 by Western authors), 1 Western.  
[158-7813]

UDC 678.766:531.93

ANTIFRICTIONAL POLYIMIDE MATERIALS "MIALON"

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 29-30

KALINCHIKOV, V. Ye., DOLMATOV, S. A., KLEMKINA, S. V. and TKACHENKO, L. A.

[Abstract] Antifrictional properties of the material "Mialon" were investigated. The test samples were prepared from a graphite reinforced polyimide of the "Mialon-812" brand and from reinforced polytetrafluoroethylene "Mialon-801" by die casting at 240°C and 35 MPa. Physical constants of these materials were reported. Both are heat resistant: after 1000 hrs at 200°C "Mialon-801" retained its mechanical qualities at a 60% level and "Mialon-812" at 90% or better. Both of these materials showed good tribotechnical characteristics. "Mialon-801" is normally used at friction points requiring electric insulation. One of the great advantages of "Mialon" type materials is the ease of their processing into various end products. Thermostability and thermodestruction studies showed both of these test samples to be about equivalent. Thus, it was shown that "Mialon" can be used at friction points with considerable heat production where electroinsulating characteristics are required. Both of these materials are considered superior to those presently used in machine and equipment construction. Figures 2; references 6: 5 Russian, 1 Western.  
[158-7813]

UDC 678.5:547.722.1:66.095.3

# SYNTHESIS OF FURANE OLIGOMERS AND FOAM POLYFURANES BASED ON THEM

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 4-6

SAMATOV, A. M., MAGRUPOV, F. A. and ABDURASHIDOV, T. R.

[Abstract] Reaction conditions for synthesis of furfuryl oligomers (FO) were studied along with the properties of foam plastics prepared from such oligomers. Homopolycondensation of furfuryl alcohol (FA) at 369-371 K and pH - 2.1-2.3 showed that, first, low molecular adducts of FA are formed, followed by an increase of molecular weight (MW) due to interaction of the adducts with each other and with the free monomer. Thus, depending on the duration of the process, oligomers are obtained with varying MW, viscosity and content of functional groups. To obtain foam polyfuranes (FPF) with uniform macrostructure, hydroxyl-nitrogen containing furanes have to be used to complex the acidic catalyst; during the foaming and crosslinking process, the temperature of the system goes up, releasing the catalyst from the complex and assuring uniform rate during the final stages of polymerization. Optimal duration of the condensation was established to be 2400-6000 sec, viscosity of FO--0.5-3.0 Pa.s. Apparent density of FPF can be regulated by FA; addition of physical or chemical gas generators is of no use. The FPF obtained showed excellent heat insulating characteristics, low absorption of water, low corrosive activity and good fire retardant property. Figures 2; references 6 (Russian).

[158-7813]

UDC 678.664.-405.8:678.044.3

# HARD FOAMPOLYURETHANES OBTAINED USING NEW CATALYSTS

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 13-15

TASANBAYEVA, N. Ye., MAGRUPOV, F. A. and ABDURASHIDOV, T. R.

[Abstract] Condensation of monoethanolamine with aldehydes gave a series of hydroxyl-nitrogen containing compounds  $R-CH=N-CH_2CH_2OH$  where  $R = -H, -CH_3, -CH(CH_3)_2$  and  $-C_6H_5$ . These reagents were substituted for Lapramol-294 as the crosslinking agent in production of foampolyurethanes (FPU). Using 10 parts of ethylidenaminoethanol or 20 parts of iso-butylidenaminoethanol gave results equivalent to the use of 40 parts of Lapramol-294. Optimal conditions were determined for above catalysts. The hard FPU based on alkyliden- and arylidenethanols surpassed the FPU-307 foam plastic both by their catalytic activity and by physical-mechanical properties. Figure 1; references 11: 7 Russian (2 by Western authors), 4 Western.

[158-7813]

UDC 678.742.2-405.8.029.44

PROPERTIES OF FOAM POLYETHYLENE OBTAINED BY FREE FOAMING METHOD

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 23-25

MAYEVSKIY, V. S., PEVITSKAYA, G. I., KUDRYAVTSEVA, T. Ye. and BOGAYENKO, I. N.

[Abstract] Possibility of obtaining foam polyethylene (FPE) from the following composition was evaluated: foam forming, vulcanizing polyethylene 108-580--100 parts, porofor ChKhZ-21--6 parts, dicumyl peroxide--0.8 parts, zinc oxide--0.5 parts, zinc stearate--1.5 parts and stearic acid--1.0 part. The rate constant ( $K_F$ ) and the degree of foaming were determined showing that they increased with increasing temperature: at 150° C,  $K_F$  was negligible, requiring 18 min for a complete foaming process; at 210°C,  $K_F$  was at its maximum and the foaming process was completed in 6 min. FPE samples with different apparent densities differed from each other: their strength elasticity and water absorption were functions of the apparent densities. The simplicity of the production of FPE by the free foaming method and the wide spectrum of physical-mechanical properties obtained makes this plastic suitable for many applications in national economy. Figures 2; references 6 (Russian).  
[158-7813]

UDC 678.674'41'5:66.093.8:678.029.65

POLYCARBONATES WITH INCREASED HYDROLYTIC AND FIRE STABILITY

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 25-26

KORSHAK, V. V., SMIRNOVA, O. V. and SINGKH, R. M.

[Abstract] Using the interphase polycondensation method, low molecular weight polycarbonates (PC) were obtained from 2,2-di-(4-hydroxy-3,5-dibromophenyl)-propane (TBD) and phosgene. To increase the molecular weight of PC, they were modified with brominated bisphenols. The new polymers showed high chemical stability and good fire retardance. These materials performed better in acid and base solutions than the standard PC "Diflon". Fire retardant property of these new PC's has been shown to increase with increased bromine content in the polymer chain (the correlation coefficient for this function was  $r = 0.986$ ). Figure 1; references 4: 3 Russian, 1 Western.  
[158-7813]

UDC 678.742.2.029.72

AGING OF COMPOSITIONS BASED ON SECONDARY POLYETHYLENE UNDER CLIMATIC  
CONDITIONS

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 26-27

ZABARA, M. Ya., SLITENKO, N. Ya., GNIDASH, A. V., LEVINA, S. S. and  
GRITSENKO, A. V.

[Abstract] Because of the wide use of secondary polyethylenes (PEV), their stability and mechanical properties were studied under climatic conditions prevalent during storage and in actual usage of such materials. PEV, brand A (TU 63.178-74-81) was used in these tests stabilized with technical carbon DG-100 and containing some primary polyethylene of high pressure (PEVD). The tests showed that introduction of 2% DG-100 to PEV had no significant effect on any of its properties. Addition of PEVD increased their index of fluidity and relative stretching at a breaking point while decreasing the temperature of brittleness. Resistance to aging of stabilized PEV samples was lower than the resistance of stabilized PEVD. Stabilization with technical carbon and with up to 25% PEVD increased the resistance of PEV to aging, but the photooxidative processes due to UV irradiation continued; this makes it impossible to use or store PEV for a length of time in open air. Figure 1; references 5 (Russian).  
[158-7813]

UDC 678.5.8:536.4

DETERMINATION OF TCLE OF PLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 85 pp 34-36

LANDA, Yu. I., MERKEL', N. D., NEVEL'SKIY, I. V. and SUKHARINA, N. N.

[Abstract] Thermal coefficient of linear expansion (TCLE) was studied as a function of temperature using the following plastic samples: Fluoroplast-3, Ebonite, Polycarbonate Diflon PK-2, Composition DAK-G2 and Composition DAK-8. A copper sample, calcined in vacuum, served as a comparison standard. Experimental data were tabulated for the temperature range 80-360 K. The data obtained makes it possible to calculate heat expansion of various construction elements made of the materials studied. References 8 (Russian).  
[158-7813]

RADIATION CHEMISTRY

UDC 541.183.5:546.791

STUDY OF ADSORPTION OF URANIUM FROM CARBONATE-CONTAINING SOLUTIONS BY  
INORGANIC ADSORBENTS: VIII. KINETICS OF ADSORPTION OF URANIUM FROM  
SOLUTIONS OF SEA-WATER TYPE BY TITANIUM-CONTAINING ADSORBENT WITH PARTIALLY  
DISORGANIZED STRUCTURE

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 25 Feb 83) pp 579-600

MYASOYEDOV, B. F., NOVIKOV, Yu. P., MAMEDOV, R. M., KOMAREVSKIY, V. M.,  
SHARYGIN, L. M., GONCHAR, V. F., MALYKH, T. G., and NURIYEV, A. N.

[Abstract] Sodium uranyl tricarbonate was dissolved in sea water to a uranium concentration of  $8.4 \times 10^{-3}$  mol/l; a solution of metallic U-233 dissolved in hydrochloric acid was also added to sea water to a uranium concentration of  $3.52 \times 10^{-5}$  mol/l. Mixing solutions and adjusting pH to 7.85 produced standard solutions, marked with U-233, at intermediate concentrations up to  $2.13 \times 10^{-3}$  mol/l. Measurement of adsorption on Termoksid-5 at 20-65°C indicated saturation within 8 h and an adsorption constant dependent on temperature but not concentration. Under these conditions, the enthalpy of activation was 12,650 J/mol, considerably lower than published values for adsorption on metatitanic acid, indicating the disorganized crystal structure of Termoksid-5 loosens the bonds in the solid phase, thus sharply lowering the potential barrier to adsorption. Figures 3; references 9: 1 East German, 5 Russian, 4 Western (2 by Russian authors).  
[85-12672]



UDC 542.61

INFLUENCE ON INTERPHASE TENSION OF NATURE OF COMPONENTS OF EXTRACTION  
SYSTEMS USED FOR RECOVERY OF RADIONUCLIDES

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 21 Apr 83) pp 616-620

SHMIDT, V. S. and NIKITIN, S. D.

[Abstract] Measurements of interphase surface tension at 298°K were made between, on the one hand, pure water or aqueous solutions of lithium nitrate (10 mol/l) or uranyl nitrate (1.79 mol/l) and, on the other hand, dodecane solutions of tributyl phosphate, trioctylphosphinoxide, and uranyl nitrate disolvates of these two compounds. Interphase tension dropped with increasing concentration of the phosphorous compounds in the dodecane. At low concentrations, systems with the same interphase tension had the same concentration of free phosphorous compounds in the organic phase; i.e., the phosphorous compound bound as solvate was surface inactive. At low concentrations, the interphase tension was also lower for the lithium nitrate solution than for pure water and lowest when the aqueous phase was a concentrated uranyl nitrate solution. Figures 3; references 4: 3 Russian, 1 Western.  
[85-12672]

UDC [546.99:539.163/4]:001.8

SEARCH FOR UNKNOWN RADIOEMITTERS IN NATURE: II. METHODOLOGICAL QUESTIONS  
OF HIGH ENERGY ALPHA SPECTROMETRY

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 1 Mar 83) pp 656-662

BOGDANOV, R. V. and MYSHINSKIY, G. V.

[Abstract] In order to avoid the errors common in prior works examining the question of natural alpha emitters over 8.8 MeV, the magnitude and source of background radiation in this region of the spectrum was examined. No less than ten factors explaining the appearance of high energy impulses were identified; those examined included: alpha-beta coincidence in the thorium disintegration chain; alpha-alpha coincidence in the actinouranium chain; random alpha particle coincidences; penetrating alpha particles from some natural radionuclides; spontaneous fission of uranium; cosmic ray background; microdischarges within the semiconductor detector; leakage and discharges in associated high voltage circuits; interference in the electrical supply circuit and electromagnetic induction; and the "microphone" effect. The authors recommend detailed descriptions of experimental conditions in any articles on new emitters and the exclusion of events not at least 4-5 standard deviations above background. Figures 3; references 20: 12 Russian, 8 Western.  
[85-12672]

UDC 535.373.2:546.791.6:546.799.6

PHOTOLUMINESCENCE OF CURIUM (III) IN PRESENCE OF URANYL

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 19 Feb 83) pp 662-666

YUSOV, A. B., PERMINOV, V. P. and KROT, N. N.

[Abstract] The chemiluminescence of curium (III) was studied in the range 15-47° K in sodium nitrate (0.5 mol/l) and tetraborate (0.025 mol/l) solutions of uranium (VI). The curium was added by first drying measured amounts of curium nitrate and re-dissolving in water to eliminate the trace amounts of hydrogen peroxide which can significantly skew results. For nitrate solutions of uranium (VI) ( $10^{-5}$  to  $10^{-4}$  mol/l) and curium ( $10^{-7}$  to  $5 \times 10^{-6}$  mol/l), luminescent response to nitrogen laser excitation is very dependent on pH--uranyl luminescence begins at pH 4.5, peaks at pH 6.0 and disappears by pH 8.0; curium luminescence begins at pH 6.0, peaks at pH 7.0-7.5, and disappears by pH 11.0. The extinction curve of the curium is dependent strongly on pH and temperature, less on ion concentrations, and not at all on the intensity of the exciting laser light. Curium luminescence appears even above the pH 7.5 region when uranyl luminescence disappears, but it requires a minimum uranium concentration of  $10^{-5}$  mol/l. Curium concentration does not affect the intensity or duration of the uranyl luminescence. Energy transfer apparently takes place not in the solution, but only on the surface of colloidal sodium uranate particles; these adsorb hydrolyzed curium ions which in turn luminesce as they deactivate excited, partially-hydrolyzed uranyl ions present in the particle. Figures 5; references 10: 3 Russian, 7 Western.  
[85-12672]

UDC 502.55(204):621.030.7

ANALYSIS OF MATERIALS FOR CONTENT OF PLUTONIUM AND OTHER NUCLIDES IN ITEMS OF SURROUNDING ENVIRONMENT

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 25 May 83) pp 694-697

PCHELKIN, V. A., SVIDERSKIY, M. F., MOSHCHANSKAYA, N. G., POZDNYAKOV, N. Yu. and NOVIKOV, Yu. P.

[Abstract] An assessment is reported of methods of determining trace amounts of plutonium and neptunium and differentiating them from uranium and thorium. These radionuclides are, usually, first concentrated by coprecipitation and then subjected to ion exchange. Anion exchange resin VP-3Ap showed good selectivity, separating uranium in a nitric acid medium and thorium in a hydrochloric acid medium. Desorption was by dilute hydrochloric acid with added hydroxylamine. Solvent extraction then allowed easy separation of

plutonium or neptunium from uranium or thorium. Plutonium can be extracted from river sediments and separated from uranium and thorium by the use of trilaurylamine in xylene. Because of its low alpha activity, neptunium-237 requires more sensitive methods; infrared phosphorescence allows determination of  $10^{-3}$  g of  $^{237}\text{Np}$  even mixed with plutonium and uranium. Isotopic dilution can be used to simplify determination of the latter two elements. Figures 4; references 11: 6 Russian, 5 Western.  
[85-12672]

UDC 539.143.43:546.791.6-145

# LIQUID-CRYSTAL PROPERTIES OF SOLUTIONS OF SOME COORDINATION COMPOUNDS OF ACTINIDES

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 25 May 83) pp 708-713

SHCHERBAKOV, V. A. and SHCHERBAKOVA, L. L.

[Abstract] Water-acetone solutions of uranyl fluoride formed lyophilic liquid crystals with a degree of order over 0.2; neptunyl fluoride showed a similar effect. Nuclear magnetic resonance spectroscopy of deuterated systems showed a quadrupole separation whose amplitude was dependent on both temperature and the composition of the solutions. Uranyl fluoride can polymerize in tributylphosphate and other organophosphorus extractants. Magnetic resonance spectra of  $^2\text{H}$  and  $^{17}\text{O}$  indicated the systems were mesomorphic and based on solvated polymerized uranyl fluoride which can form either nematic or smectic mesophases for different degrees of polymerization. Similar effects were indicated with uranyl perchlorate, nitrate, chloride, bromide and sulfate and with thorium tetranitrate. Inorganic liquid crystals are to be expected in actinide solutions with magnetically anisotropic coordination polymers or insular complexes of the solvate type in which large branched organic molecules serve as the ligands. Figures 2; references 8: 7 Russian, 1 Western.  
[85-12672]

UDC 546.791:546.17

REACTION OF URANIUM AMALGAM WITH NITROGEN

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 4 May 83) pp 721-725

KURANOV, K. V., MASLENNIKOV, A. G. and PERETRUKHIN, V. F.

[Abstract] The reaction of uranium amalgam with nitrogen and the effects of various factors on the process were studied. Amalgams containing 600-1000 mg/ml of mercury were treated with nitrogen at 350°-800°C. The main reaction product was a non-stoichiometric uranium nitride  $UN_x$ , where  $x = 1.5-1.8$ . The uranium dioxide content in the nitride may be lowered to 3-4 mole % by preliminary washing with dimethylsulfoxide and acetonitrile. Apparently, thermally unstable intermetallic compounds of the composition  $UHg_x$  ( $x = 1-4$ ) enter the reaction as well as metallic uranium. Raising the temperature to 800° and lowering the nitrogen partial pressure to 70 Torr does not result in formation of stoichiometric uranium mononitride. Figures 5; references 14: 3 Russian, 11 Western.  
[154-12765]

UDC 546.718:546.799.4

KINETICS OF TECHNIUM REACTIONS, PART 5: REDUCTION OF  $Tc^{+7}$  WITH URANIUM  
(IV) IN HCl SOLUTION

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 9 Oct 83 in final form 4 May 84) pp 730-734

KOLTUNOV, V. S., GOMONOVA, T. V. and MARCHENKO, V. I.

[Abstract] Tetravalent uranium, used as a reducing agent in extracting nuclear fuel, is stable in nitric acid solution containing hydrazine. However, if technitium is present, oxidation of  $U^{+4}$  with nitric acid is possible, the technitium ions acting as catalyst. In the present work, the reaction kinetics of  $TcO_4^-$  with  $U^{+4}$  in HCl solution was studied. The reaction proceeds according to the equation:  $2TcO_4^- + 3U^{+4} + 4H^+ + 10Cl^- = 2TcCl_5 + 3UO_2^{+2} + 2H_2O$ . The rate constant  $k = 152 \pm 9 \text{ min}^{-1}$  at 60°C and  $\mu = 2$  ionic force. The activation energy  $E = 98.3 \pm 1.2 \text{ kJ/mole}$ . A reaction mechanism is proposed. Figures 2; references 6: 4 Russian, 2 Western.  
[154-12765]

UDC 542.943:546.799.5

STUDY OF EFFECTS OF ALPHA-RADIATION ON VALENCE STATE OF ACTINIDS, PART 5:  
REDUCTION OF AMERICIUM (VI) IN NITRIC ACID SOLUTIONS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 23 Dec 83) pp 745-751

FROLOV, A. A., CHISTYAKOV, V. M., KORNILOV, A. S. and VASIL'YEV, V. Ya.

[Abstract] A study was made of the behavior of americium (VI) in nitric acid solution irradiated with an intense beam of alpha-particles resulting from the radioactive decay of curium-244. An empirical relationship governing the rate of the process was established, and it was demonstrated that the yield of americium (VI) reduction increases with increasing concentrations of nitric acid and lithium nitrate. This is evidently due to the effects of nitrous acid, a basic product of alpha-radiolysis of the nitrate ion. Figures 6; references 17: 11 Russian, 6 Western.  
[154-12765]

UDC 541.49(546.799.4+546.799.5)

## STUDY OF SOLUBILITY OF FORMATES OF TRIVALENT PLUTONIUM AND AMERICIUM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 15 Feb 83) pp 755-758

ANAN'YEV, A. V. and KROT, N. N.

[Abstract] The formates of trivalent actinoids are interesting because of the possibility of using them to obtain oxides. In the present work the solubilities of trivalent plutonium and americium formates in 0.5-2.0-mole/liter solutions of sodium formate and 0.01-0.1 mole/liter solutions of perchloric acid were studied. The solubility products for  $\text{Pu}(\text{OOCH})_3$  and  $\text{Am}(\text{OOCH})_3$  were determined to be  $5.46 \times 10^{-10}$  and  $1.04 \times 10^{-9}$  mole<sup>4</sup>, respectively. The compositions and stabilities of trivalent plutonium and americium complexes with formate ions were determined from the solubility data. Figures 2; references 10: 4 Russian, 6 Western.  
[154-12765]

UDC 546.799 5/8

UTILIZATION OF CATIONITES FOR SEPARATING AND REMOVING TRANSPLUTONIUM  
ELEMENTS FROM OTHERS FROM AQUEOUS AND AQUEOUS-ALCOHOL SOLUTIONS OF  
HYDROCHLORIC AND NITRIC ACIDS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 31 May 83, in final form 29 Feb 84) pp 764-770

GUSEVA, L. I. and TIKHOMIROVA, G. S.

[Abstract] The adsorption of Am, Cm, Pu and fission elements Cr, Sr, Y, Zr, Nb, Ru and Eu on cationite Dowex-50 from aqueous and aqueous-alcohol solutions of hydrochloric and nitric acids was studied as a function of acid concentration and alcohol content. The results indicate that there is a significant increase in adsorption of the transplutonium elements on the cationite from nitric acid solutions containing over 50% alcohol. Optimum conditions for concentrating transplutonium elements on cationites and subsequent separation from fission and other elements with hydrochloric and nitric acids are presented. Figures 6; references 9: 5 Russian, 4 Western. [154-12765]

UDC 543,544.6:546.92

CONTINUOUS THERMOCHROMATOGRAPHIC SEPARATION OF NON-CARRIED RADIOISOTOPES  
OF PLATINUM ELEMENTS IN AIR STREAM FROM NUCLEAR REACTION PRODUCTS IN HEAVY  
ION ACCELERATOR BEAM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 5 May 83) pp 770-778

DOMANOV, V. P. and ZVARA, I.

[Abstract] The thermochromatographic behavior of volatile oxygen compounds of platinum group metals under a continuous accelerator beam was studied to assess the feasibility of chemical separation of elements with  $Z = 108 - 110$ . The compounds were obtained by deceleration of recoil atoms from nuclear reactions in streams of dry and moist air and separation on the walls of a quartz thermochromatographic column. High volatility of Rh was observed for the first time. This is evidently due to the formation of  $RhO_3$ . Iridium and platinum precipitated out in moist air at  $20^\circ - 10^\circ C$ ,  $Os^{173}O_4$  at  $-88 \pm 10^\circ C$  and  $Ir^{183}, 184O_3$  at  $80 \pm 10^\circ C$ . Figures 6; references 24: 13 Russian, 11 Western. [154-12765]

UDC 543.53

COMPLEX RADIOCHEMICAL ANALYSIS OF RADIONUCLIDES IN AQUEOUS EFFLUENTS AND  
NUCLEAR POWER STATION COOLING TANKS, PART 1: SELECTION OF CONDITIONS FOR  
TOTAL CONCENTRATION OF GAMMA-RADIATING RADIONUCLIDES

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 18 Aug 83) pp 783-789

MEL'NIKOV, V. A., MOSKVIN, L. N. and YEPIMAKHOV, V. N.

[Abstract] The selection of conditions needed for total concentration of gamma-radiating radionuclides by adsorption of gamma-radiating nuclides present in the effluents and cooling water tanks of nuclear power stations is presented. A sorbent-collector for the total concentration of the radionuclides is to be followed by a sorbent material for the selective concentration of  $\text{Sr}^{89, 90}$ . The discussion covers modeling of contaminated water with artificial radionuclides, selection of sorbent materials, and study of the sorption properties of sulfides. Due to the specifics of recording methods, the selection of a scheme for analysis of  $\text{I}^{129}$  and  $\text{Pu}^{239}$  was omitted. Reproducibility of results is about 20% and the method may be used to monitor radionuclide concentration. Figures 4; references 6 (Russian).  
[154-12765]

UDC 546.791.06-145.15.03:535.37:536.46

UTILIZING SENSITIZED LUMINESCENCE OF EUROPIUM IN PHOSPHORIC ACID SOLUTION  
FOR DETERMINING URANIUM CONCENTRATION

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 7 Apr 83) pp 793-798

NIKITINA, S. A. and STEPANOV, A. V.

[Abstract] One of the difficulties in luminescent analysis of uranium (IV) in solution is elimination of extinction luminescence of the uranyl ion. This may be achieved by using sensitized luminescence acquired by transfer of excitation energy from the uranyl ion, serving as an energy donor, to an acceptor ion, also capable of luminescence. The uranium concentration may then be ascertained by the intensity of the sensitized acceptor luminescence. In the present work the conditions for transferring excitation energy from  $\text{UO}_2^{+2}$  to  $\text{Eu}^{+3}$  in phosphoric acid solution were studied. The extinction rate constant and the excitation energy transfer constant to Eu were determined. These values, as well as the relationship of transfer intensity in  $\text{Eu}^{+3}$  spectra, are not functions of the uranium concentration, and therefore the transfer of excitation energy from uranyl to europium ions is not related to the formation of mixed polynuclear complexes of europium and uranium. The possibility of determining uranium in solution by using sensitized europium luminescence was demonstrated. Figures 5; references 5:  
2 Russian, 3 Western.  
[154-12765]

19 April 1985

UDC 502.55(204):621.039.7

## CONTENTS OF STRONTIUM-90 AND CESIUM-137 IN SEVERAL REGIONS OF BALTIC SEA IN 1982

Leningrad RADIOKHIMIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 20 Jan 84) pp 822-826

LAZAREV, L. N., GEDEONOV, L. I., IVANOVA, L. M., ORLOVA, T. Ye.,  
STEPANOV, An. Vl. and FLEGONTOV, V. M.

[Abstract] In 1982 the Radium Institute imeni V. G. Khlopin continued with observations on the radionuclide content in the Baltic Sea basin. Samples were taken from northeastern, eastern and southwestern parts of the Baltic Sea, the Gulfs of Finland and Riga and from the mouths of the larger rivers entering the Baltic Sea from the Soviet Union. Strontium-90 and cesium-137 determinations were made using radiochemical methods together with ferrocyanide-carbonate concentration determinations from 100 liter samples. Bottom sediment was also analyzed. The results show that while the overall radiation of the Baltic Sea remains stable, there has been an increase in cesium-137 in the deep waters and bottom sediment which will require constant attention. Figures 4; references 6: 3 Russian, 3 Western.  
[154-12765]



RUBBER AND ELASTOMERS

UDC 678.672

RHEOLOGICAL BEHAVIOR OF ORGANOSILOXANE RUBBERS FILLED WITH ACTIVE SILICA

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 12, Dec 84  
(manuscript received 29 Feb 84) pp 2749-2755

SAVVATEYEV, S. G., ZHUKOV, G. I., BOGDANOV, V. V. and YEKIMOV, A. G.

[Abstract] When siloxane rubbers are blended with active silica (aerosil) under condition of high shear stress, the chain structures of the filler are ruptured throughout the oligomer and a reverse structure is formed. This structure has a thicker layer of oligomer adsorbed on the filler surface. The possibility of controlling a number of technical factors during blending is manifested by the rheological behavior of siloxane compositions.

Figures 8; references 4: 2 Russian, 2 Western.

[151-12765]

WATER TREATMENT

UDC 663.63:541.183

CLEANING LOW ACTIVITY WASTE WATER OF ATOMIC POWER STATIONS FROM RADIONUCLIDES  
WITH GRANULATED ADSORBENTS BASED ON ZIRCONIUM PHOSPHATE AND FERROCYANIDE

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84  
(manuscript received 3 Mar 83) pp 611-616

SHARYGIN, L. M., MOISEYEV, V. Ye., GALKIN, V. M., KUZ'MINA, R. V.,  
PYSHKIN, V. P., BOGUSLAVSKIY, V. B. and GUTOROVA, T. I.

[Abstract] Spherical granules of zirconium phosphate and ferrocyanide with a diameter of 0.5-0.9 mm were prepared by treating the hydroxide with phosphoric acid and with an acidic solution of potassium ferrocyanide respectively. One phosphate sample was also reworked with concentrated phosphoric acid. Additionally, a modified commercial zirconium phosphate was also tested on actual waste water of the Beloyarsk atomic power station. In addition to static adsorption tests, two runs were made of samples in glass adsorption columns passing approximately 10 and 7 thousand column volumes respectively. Adsorption of cesium changed little over the range pH 3-7, but rising pH significantly increased the adsorption of strontium and, generally, of cobalt. The coefficient of separation of cesium dropped with continuing column use, reaching approximately unity for unaltered zirconium phosphate after about five thousand column volumes, but still remaining at 4-5 for modified zirconium phosphate after nine thousand column volumes. Overall, the modified zirconium phosphate showed the best adsorption of cesium, followed by the ferrocyanide and then the unaltered phosphate. For these three adsorbents, average coefficients of separation were respectively 12.7, 3.5, and 1.8 for cesium; 1.3, 1.0, and 2.6 for strontium; and 1.3, 1.1, and 1.1 for cobalt. The reworked phosphate showed significantly poorer adsorption of cobalt and strontium and had a much lower specific surface area. Figures 2; references 23: 16 Russian, 7 Western.  
[85-12672]

UDC: 541.127:128+543.06

MECHANISM OF CATALYTIC OXIDATION OF WATER BY  $\text{Ru(dipy)}^{3+}_3$  COMPLEX IN PRESENCE OF COBALT SALTS IN WEAKLY ALKALINE SOLUTIONS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 11, Nov 84  
(manuscript received 30 Jun 83) pp 1584-1590

MORAVSKIY, A. P., KHANNANOV, N. K., KHRAMOV, A. V., SHAFIROVICH, V. Ya. and SHILOV, A. Ye., Chernogolovka Branch of the USSR Academy of Sciences, Institute of Chemical Physics,

[Abstract] A study was made of the kinetics of the interaction of  $\text{Ru(dipy)}^{3+}_3 + \text{CO(II)} + \text{H}_2\text{O}$ , in which oxygen is liberated, in order to explain the mechanism of the process. Previous studies have shown that this reaction occurs only in the presence of catalysts, oxygen being produced in the reactions by means of metal compound trace impurities. The reaction, catalyzed by cobalt salts, occurs in seconds. It was studied in a suspended flow installation with no metal parts in contact with the solutions, allowing the study of processes with minimum half life 1 ms, recording changes in optical density of the reaction system. The kinetic curves of the process show a clear induction period, during which the bivalent cobalt is oxidized to trivalent cobalt. The reaction rate is proportional to the concentration of  $\text{Ru(dipy)}^{3+}_3$  and the initial  $\text{Co(II)}$  concentration. The limiting stage is thus interaction of the oxidizer with the catalyst. The reaction rate decreases with increasing accumulation of the end product. It is found that free hydrogen peroxide is not formed as an intermediate product in the reaction. Induction periods are observed when  $\text{Fe(III)}$  and  $\text{Ni(II)}$  are used as catalysts, but not when  $\text{Cu(II)}$  is used. Figures 2; references 12: 4 Russian, 8 Western.  
[77-6508]

MISCELLANEOUS

UDC 547.673+541.143

PHOTOCHEMICAL PROPERTIES OF O-ACYL DERIVATIVES OF 1-OXY-2-METHOXYANTHRAQUINONE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA  
KHIMICHESKIKH NAUK in Russian No 17, Issue 6, Nov 84  
(manuscript received 4 Jun 84) pp 84-88

KLIMENKO, L. S., GRITSAN, N. P., KONSTANTINOVA, A. V. and FOKIN, Ye. P.,  
Novosibirsk Institute of Organic Chemistry, Siberian Department USSR  
Academy of Sciences; Institute of Chemical Kinetics and Combustion,  
Siberian Department USSR Academy of Sciences, Novosibirsk

[Abstract] The photoacylotropy of 9,10-anthraquinone derivatives was studied over a broad range of structurally varying migrating acyl groups. For this purpose 12 O-acyl derivatives were synthesized and their photochemical properties studied by low temperature spectrophotometry and impulse photolysis. Photoinitiated, thermally-reversible migration of the acyl group resulting in isomerization of the 9,10-anthraquinone structure into 1,10-structure took place with all of the compounds studied. Analysis of isomerization rate constants shows that the structure of the O-acyl group affects the rate of dark migration of the acyl group. Figure 1; references 8: 7 Russian, 1 Western.  
[126-12765]

- END -